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Each Piece of Glass Tells Its Own Story

Each Article of Glass is Indelibly Impressed During the Course of Manufacture with Markings which Expose to the Inquiring Observer its Origin and the Method by which it was Produced. How this Enables him to Detect, Identify and Interpret the Differing Processes, and to gain pleasure and perhaps profit from the knowledge, is told here by a practical engineer who from boyhood to maturity has been actively engaged in the wondrous art of glass making.

By ROY E. SWAIN*

PRACTICALLY every piece of glassware that goes to market carries with it a fairly comprehensive story of its own manufacture. In some instances this story may have been blurred to some extent by finishing processes such as etching, sand blasting, and so forth. However such treatment hides little from one trained in handling such ware. In order to read the story one must be familiar with factory methods.

In handling sheet or flat glass it is fairly easy to distinguish between plate glass and blown or drawn glass, for the polished plate glass presents to the eye a perfectly plain surface while by reflected light the drawn or blown glass shows slight surface undulations. But it takes greater skill to detect the difference between blown and drawn window glass and still greater to tell whether the blown glass was hand blown or machine blown, or whether the drawn glass was made by the horizontal or vertical process. The trained window glass man will at a glance determine the method of manufacture by means of the slight bow of the sheet, the shape of the bubbles or seeds, drawing-block marks, slight surface sheen and other characteristics. These would seldom or never be noticed by the average householder when buying glass.

Flat glass may enjoy a wider and more conspicuous use than household glassware but the purchasers of flat glass are few as compared with the number of people who buy glass novelties, tableware, decorative and lighting glassware.

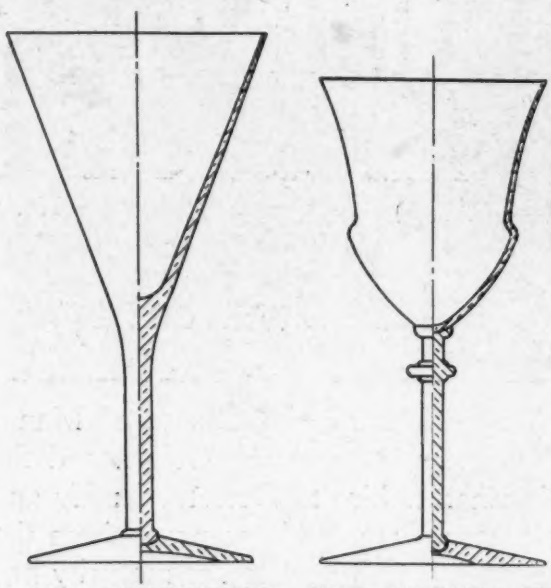
In looking over a collection of drinking glasses one may find several made after the same design but differing greatly in execution. The paste mold tumbler[1] is found to be very light especially at the edge, has a high surface polish, and usually when tapped with a pencil or other light article gives out a clear musical ring. Closer examination discloses a number of fine lines running around the article and concentric circles showing on the bottom. It may be necessary to reflect the light from the surface of the glass to the eye to detect these lines. A quick away to check the surface finish of glassware is to read medium small print through it, the glass being held a few inches from the print. If the finish is good the print will appear sharp and distinct, while a poor finish will give the letters a blurred effect and very poor finish may even make it impossible to read it.

Another type of thin blown tumbler is known as "hot mold." It derives its name from the fact that the cast iron molds in which this class of ware is blown must be worked at a dull red heat to prevent chills, crizzles, and other defects. The edge of this ware will be found to be quite thin if not as thin as that of the paste mold article. About the middle section of these tumblers, of the "press and blow" variety, will usually be found an "optic band" caused by unequal distribution. The surface of the glass is somewhat dull as the grain of the cast iron is imprinted there. In the bottom of the press-and-blow variety of hot mold ware is found a circle not always concentric with the circumfer-

* Formerly of Macbeth-Evans Glass Company, Mechanical Development Department.

[1] A lubricated mold.

ence of the bottom. This circle is known as the valve mark as it is made by the ejecting valve of the press mold in which the blank is formed. This class of ware is seldom made plain as the dull surface finish and uneven distribution are very noticeable and unattractive. By means of figures and designs these defects may be partly concealed.



AT LEFT: HAND-MADE FOOT. *RIGHT:* PASTE-MOLD WITH PRESSED STEM AND HAND-MADE FOOT

The usual method is to cut flutes or other simple designs in the plunger forming the initial cavity in the blank of hot glass. These when blown out form a somewhat regular pattern that is pleasing to the eye. Another method consists of chipping or cutting designs in the blow molds.

This ware, like the paste mold ware, is blown with a certain amount of waste glass that must be removed. This will be discussed under finishing.

There are also the very heavy tumblers made by straight pressing. These are usually fire-polished to restore the brilliancy of the glass and remove the mold marks. This class of ware is usually very regular in design and execution. Pressed ware may be distinguished by the mechanical execution, the surface pattern produced by the grain of the mold material, the seams indicating the joints of the mold and the more or less prevalent shear mark.

Stem Ware

Another type of glassware, known as stem ware, is also made by several different processes. The better grades of this ware are made by hand gathering and paste mold blowing. A small knob is formed on the outer end of the gathering and a stem drawn by means of this knob. After the bowl has been blown in a paste mold, the foot setter assisted by a bit gatherer deposits a small amount of glass on the knob and by means of tools called clappers fashions the foot. This ware has the fine markings around the bowl as already described for paste mold ware and there is a distinct welded joint where the foot is set on. Faint concentric rings mark both top and bottom of the foot and there is usually a shear mark in the center of the bottom of the foot. The edge of the foot is usually very light and gives the foot an appearance of distinction.

Occasionally one finds a piece of stem ware having a welded joint between the stem and the bowl. This stem is made of a separate gathering of glass and by means of tools is usually given a somewhat fancy shape. A foot is then set on the stem but the method used seldom produces the round, well proportioned foot described in the preceding paragraph.

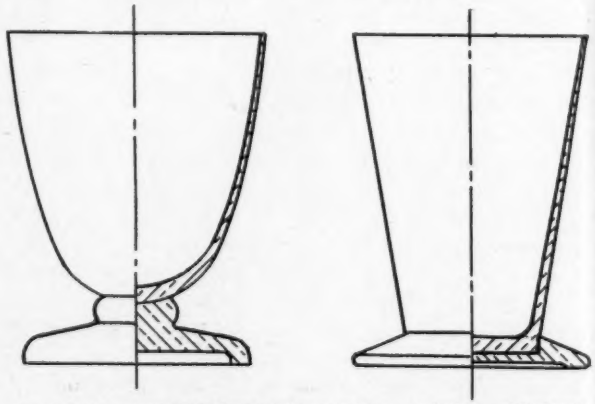
The paste mold blown bowl with pressed stem and set-on foot is marked by the welded joints at either end of the stem and the stem has two or three vertical seams. Figures or designs are often used to conceal these seams. The surface finish of the pressed stem is not as perfect as that of the drawn or tool-fashioned stem.

Pressed-and-blown stem ware may be known by the hot-mold surface of the glass, the optic band caused by the uneven distribution and the mold seams. Blank seams and mold seams seldom coincide and the seam about the foot is also an easily detected mark of the pressed-and-blown stem ware.

A still heavier variety of stem ware is the pressed cup-foot line. This ware is partly formed in complicated press molds, warmed in and finished by opening the cup to form the foot. The upper portion of the bowl is free from vertical seams but beneath the bowl is an offset that marks the joint between the shell section of the mold in which the bowl is formed and the sectional part of the mold in which the stem is formed. The foot is pressed in the shape of a cup or thimble and flared to form the foot. This foot is lighter than one made by straight pressing. The vertical seams on the stem fade out about midway between the stem and the edge of the foot.

Ware made by straight pressing is heavy, vertical seams run from top to bottom and while usually finished and ornamented by means of panels, etc., the usual marks of pressed glass may be detected by close examination.

Some drinking glasses are footed but without stems. The foot may be set on as in the stem variety and may be easily distinguished by the same sharpness of outline and concentric tool markings described above when considering stem ware.



AT LEFT: FOOT PRESSED ONTO BOWL. *RIGHT:* TUMBLER USED AS PLUNGER TO PRESS FOOT

When the foot is pressed on the bowl it has the usual mold

AT LEFT: PRESSED AND BLOWN TUMBLER, BURNED-OFF FINISH, SHOWING VALVE MARK IN BOTTOM. *AT RIGHT:* PRESSED AND BLOWN TUMBLER, MOLD MARKS SHOWING IN FOOT

seams and is recessed in the bottom. This recess is necessary to provide plunger displacement sufficient to fill the outer portions of the foot-mold. Another type of footed tumbler is made by using the bottom of the tumbler as a plunger. Articles made by this method are easily detected by the type of joint between the foot and the bowl. A little study of the cross-section of the article will acquaint one with the construction and markings.

Another line of hollowware of larger dimensions may be represented by a group of common water pitchers or jugs. A little more variety enters into the manufacture of this class of ware but the variations will all be noted by the special markings. Not a small amount of this ware is made "off hand," that is without the aid of molds. Off hand made articles have, except for a few light tool-marks, a perfect fire polish finish. The bottom of this ware is often stone-polished to remove punty or post-marks. Perhaps the most attractive feature of hand made glassware is the life and individuality of each separate piece. The paste mold article is not greatly unlike one made by the off hand method. It is a little more mechanical in execution and has the light surface lines peculiar to paste mold ware.

The iron mold blown pitcher has the vertical seams made by the parting lines of the mold and the slightly dulled surface common to hot mold glassware. As the iron mold ware is usually hand finished a projecting foot is often provided to secure the article in the finisher's snap. Machine-made iron mold ware of this general type is blown from pressed and also from blown blanks. The same optic bands, valve marks, iron mold seams and hot mold surface finish that mark the smaller pressed and blown articles are found in the larger articles made by the same method. The pitcher made from a blown blank differs from one made from a pressed blank in that the baffle plate mark of the blown blank is larger and less regular than the valve mark of the pressed blank. Due to the greater flexibility of design possible in the blown blank a more uniform weight distribution is usually found in ware made from blown blanks especially in the heavier and more complicated articles.

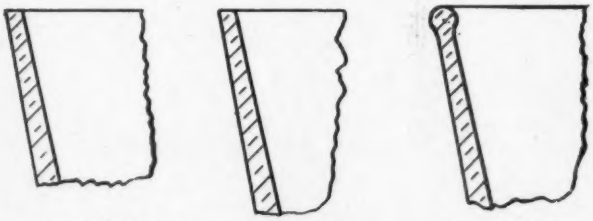
Many jugs are made by pressing. In the more elaborate ones the finisher cuts down the tops and shapes the lips. All may be known by the usual marks of pressed ware as previously described.

Handles for pitchers are made in a number of ways. The off hand or hand made handles are always found on the off hand and paste mold ware and may be found on any of the other types except the blown blank article, which is a strictly machine made line. The hand-made handle, when made plain, has a perfect surface finish. The handle setter takes a quantity of glass on a punty and attaches it to the article, draws the hot glass out to the required length and shears at or near the punty. He then catches the free end of this stem of glass attaches it to the article to form the other end of the loop which he then gives the shape desired.

PRESSED AND BLOWN STEMWARE. *AT LEFT:* PRESSED AND BLOWN TUMBLER. *CENTER:* PRESSED CUP-FOOT STEMWARE. *RIGHT:* PASTE MOLD BOWL WITH PULL-OUT STEM AND HAND-MADE FOOT

This method forms an undercutting around the handle at the point of attachment that is sometimes imitated, but the imitation will seldom bear examination.

Handles are sometimes attached to iron mold articles by first pressing the handle and placing it in a receptacle in the



STONE-POLISHED GLAZED BURNED OFF

TYPES OF FINISHING (ENLARGED)

iron blow mold and blowing the article out against the exposed ends of the handles where the two hot glasses, coming in contact with one another, form a fused joint. These handles have the seams and surface finish of pressed ware and may be further identified by the two fused joints which are unusually rough. When the article is blown first and the handle pressed on, the same markings prevail except that the fused joints are more perfect and a small finished spot on the handle indicates the position of the gate through which the mold filled.

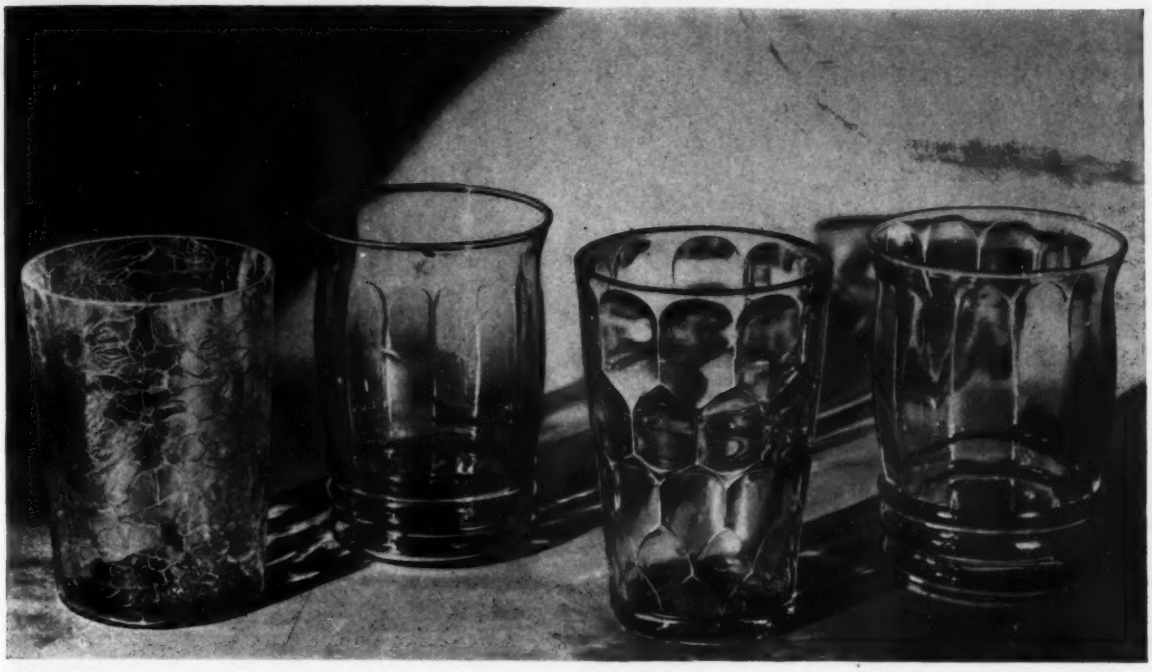
In making handled ware by the press and blow method the handle is sometimes pressed in the blank mold and the lower end attached in the blow mold. The fused joint at the lower end of the handle with the absence of a fused joint at the upper end will serve to distinguish the origin of these handles.

In the straight pressed article the handle may be designed to imitate one made by hand but the surface finish and seams will serve to make known the method used in forming the handle. There is also a seam or lap around the handle that indicates the fusion of the two streams of glass forming the handle. This line is sometimes so light that very careful examination is required to find it.

Flat Ware

We may take the salad plate as a fair representative of the shallow ware line. A number of methods are used in making this class of ware and each leaves certain markings that make it possible for one to determine the origin of the different pieces. The hand made article, made from a blown ball, when made plain, has a perfect surface finish. It is free from seams but on the bottom will be found the post or punty mark or the spot made by the stone polisher in removing the punty mark. The slight irregularity of shape and the musical sound given out when tapped with a light object will also aid in identifying the hand made article.

The pressed article shaped by the finisher has a fire pol-

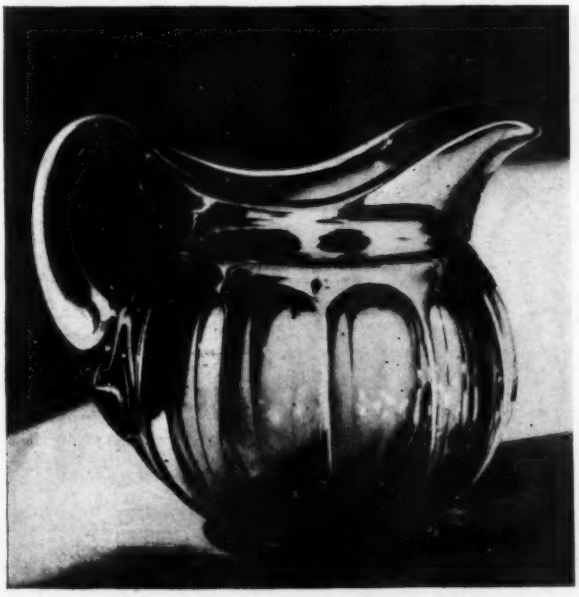


AT LEFT: PRESSED AND BLOWN CRACKLED FINISH. *LEFT CENTER:* MACHINE-MADE PASTE MOLD TUMBLER. *RIGHT CENTER:* STRAIGHT PRESS. *AT RIGHT:* PRESSED AND BLOWN TUMBLER, BURNED-OFF FINISH

ished finish except in the center of the bottom. The seat is stone polished to obtain a plain surface and remove the mark made by the post or punty. When provided with a foot to engage the finisher's snap the stone polishing may be eliminated. The straight press-made article not reshaped by the finisher is usually placed on a former and fire polished on one side. This ware has the mold seams, dull finish and other distinguishing marks as described for pressed ware.

Decorations and Finishes

In the manufacture of blown glassware a number of decorative and finishing processes are employed. One widely used means of decorating glassware is generally known as the "optic." The optic effects are the result of unequal distribution of glass in adjacent sections of the article. This unequal distribution of glass is obtained in various ways but in manual blowing it is obtained by using two forming means. In the first mold the design is made on the outside of the article or blank; then by blowing the blank in the finishing mold the outer surface of the article is made smooth and the inner surface uneven. The optic effect is due to the refraction and reflection of light and practically disappears when the article is filled with a transparent liquid. In the manually blown ware the distribution of glass may be studied by examining the edge of straight or spiral optic tumbler or goblet.



PRESSED PITCHER WITH HAND-MADE HANDLE

To employ this principle in the decoration of pressed and blown ware the design is cut on the plunger forming the initial cavity in the blank. The resulting glass distribution is quite the same but the control of the design is more perfect and it is found better to stop the design just short of the finishing line, so the study of the distribution can not be made as in the manually blown ware.

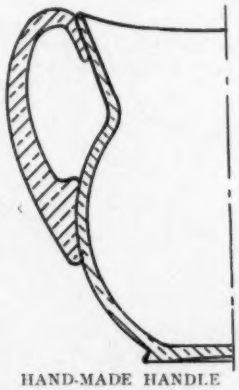
Water crackling breaks up the outer surface of the glass. The patterns vary greatly but are of two distinct types, the open and the closed varieties. The closed variety is produced by blowing the blank in the mold before immersing it in the water and presents a relatively smooth surface. The small crackles reflect the light and give the article a very pleasing appearance. The open crackle is produced by immersing the blank in water before blowing; the blowing further expands the glass and opens the cracks to form a surface similar to "alligator hide."

Crackling in machine production is accomplished by

AT LEFT: STRAIGHT PRESSED STEMWARE. *LEFT CENTER:* PASTE MOLD COLORED BOWL, PRESSED STEM, HAND-MADE FOOT. *RIGHT CENTER:* PASTE MOLD SET ON FOOT. *AT RIGHT:* COLORED ARTICLE AND HANDLE PRESSED IN ONE OPERATION.

means of cold blank molds or by spraying the pressed blank of glass with water before blowing. These crackles are very fine and shallow and the patterns irregular. The imitation crackling more often employed in machine production is readily detected as the design protrudes from the glass and the pattern has a mechanical regularity.

Blown ware of the types considered in this article usually



HAND-MADE HANDLE

require finishing, that is a certain amount of waste glass must be removed and the resulting edge treated to make it presentable. Until fairly recently this work has been done in a separate department after annealing, but we now find that a great portion of the lighter ware is finished as it comes from the molds prior to annealing. This is accomplished by burning off the waste glass and glazing the edge of the article by means of a very sharp cutting flame brought to bear on the finishing line. Lighter articles finished by this method will be noted instantly by the distinct bulb edge finish. This edge is slightly heavier than the adjacent side wall thus giving the article additional protection against hard usage.

In finishing annealed glassware of the same general type as drinking glasses the waste glass is first cracked off by an application of heat and the resulting edge smoothed by grinding on a fine-grained stone. The glass is then fire finished to remove the sharp corners and restore the brilliancy of the glass. This finish will be recognized by its glossy smoothness in connection with the mechanical exactness of the finishing line.

Crackled glass, fluted optic and heavy walled articles do not finish well by glazing so are generally finished by stone polishing. This finish presents a plain surface slightly beveled at the edge and lacks the gloss of fire finished ware.

Only commonplace glassware and well-known methods of manufacture have been considered, but by the same markings the more complicated and unusual glassware may be analyzed. Glass is so sensitive that it makes a record of practically every operation used in its manufacture.

Society of Glass Technology

At the meeting of the Society of Glass Technology held in Stourbridge on March 19th, 1930, the following three papers were presented:

1. NOTES ON THE MANUFACTURE OF REFRACTORY MATERIALS IN AMERICA. BY MR. G. V. EVERS.

Several works were linked closely together in management and standardization of sizes and shapes of goods had proceeded much further than in this country. The American firebrick works were not far ahead of us; in fact, in certain matters we were definitely leading.

The types of clay in use, and the design of the kilns were described. The excellent and accurate size and shape of the American firebrick were remarkable, whatever the refractory standard might have been. All processes except burning were cheaply performed, yet prices obtained seemed to be very high. The firebrick works plant of the St. Louis district were comparatively modern, clean and efficient. Fuel economy in the burning process ranged from very bad to very good. In only one plant was a continuous kiln seen, the hot gases being drawn from one chamber to the next. The number of modern plants still relying on the individual kiln system was surprising. Tunnel kiln firing was being adopted in an elaborate form, the Harrop kiln being most popular for refractory articles. In the Missouri district, in particular, the manufacture of the highly refractory diaspore brick was an outstanding feature. Glasshouse pots and blocks were seen in process of manufacture. The pots were made by hand, as with us, and were as thick as ours, in contrast with the German practice. Tank block sizes and shapes were particularly uniform and good, and were a lesson to us, but for ultimate quality we had, probably, the advantage. For silica brick burning, the circular independent kiln was in use except at one works.

2. GLASSHOUSE REFRACTORIES—A STUDY OF CORROSION RESISTING PROPERTIES. BY J. H. PARTRIDGE, PH.D., AND H. C. BIGGS. (*A Communication from the Research Laboratories of the General Electric Company, Ltd., Wembley.*)

Dr. Partridge showed that it was very desirable to obtain a method of measuring rapidly and quantitatively the corrosion resisting properties of refractory materials with a view to correlating the results of laboratory tests with those of actual service. The test proposed by Mr. E. J. C. Bowmaker (J. Soc. Glass Tech. 1929, 13, 130) had been utilized in this newer work, and had become part of the laboratory routine work on tank blocks.

This test was applied to a number of samples of tank blocks, some of which had been tested in actual practice. The results obtained in the acid corrosion test classified the blocks in the same relative order as their behavior in practice. Particulars of texture percentage chemical composition, firing, and crystalline constitution of the samples were given together with the percentage loss in weight in the acid corrosion test, and the true and apparent porosities. Tests were made on samples as received, and after refiring to 1,450° for 5 hours. A study of the results showed that:—

(a) An improvement in resistance to acid corrosion was, in all cases, effected by refiring to 1,450°.
(b) The greater the alumina content the greater the resistance to corrosion, and
(c) Low true porosity was beneficial and should not exceed 20 per cent.

Tests on sillimanite showed that the character of the bond was a vital factor. Not only must sillimanite be fired to 1,450°, but the choice and amount of bonding material were of great importance. Application of the acid corrosion test to pot-clay mixtures revealed that this test did not differentiate readily between the mixtures. The resistance to corrosion of the pot-clays was less than that of the good tank blocks examined.

3. SOME PRACTICAL RESULTS WITH SILLIMANITE GLASSHOUSE REFRACTORIES. BY MR. L. C. GOUGH.

Difficulties met with in the early stages of the production of sillimanite pots were described, these appearing to be due largely to the use of an unsuitable clay as a bond. In only isolated cases had sillimanite pots produced stones in glass, and later results indicated that a more suitable clay bond was now in use. Higher temperatures of firing were also now applied, and hopes were held out for a more satisfactory pot. Pot-rings had remained in glass for ten or more weeks, and given satisfactory service, but observations proved that, until the ring was sufficiently cheap to be used for one week only, to meet the custom of the glass workers, the use of such rings would not be extensive. It was hoped that the cheap rings would soon be available. Sillimanite sieges in pot furnaces were now common; in either the "rammed" or the block form. Sillimanite tank blocks had given very good results in the dog-house, as mantle blocks over the dog-house, and on the flux line. Used in ports, the verdict had been variable. Samples were shown of blocks which had been used in a tank lining for twelve months, double the life of clay blocks in this furnace. It was recommended that the sillimanite content of blocks should not be too high, owing to the difficulties of bonding.

Vanadium and Some of Its Uses

A comprehensive article "Vanadium and some of its Industrial Applications," by Jerome Alexander,[1] appeared recently in the *Journal of the Society of Chemical Industry.* The major part of the article is a decidedly interesting story of the development of uses of vanadium in metallurgy, agriculture, pharmacy, in the dyeing industry and so forth.

In the section treating of the uses of vanadium in glass, the author reproduces some spectro-photographs of vanadium glass made under Patent No. 1,292,148 issued to W. C. Taylor of the Corning Glass Works. These spectro-photographs show that a glass containing only 0.2% vanadium cuts off practically everything in the spectrum below 3580 Angstrom units, in spite of the fact that the vanadium glass is practically colorless.

One use suggested for this glass is in the manufacture of laminated glass made by cementing two glass sheets to an intermediate sheet of celluloid or pyralin. The long ultraviolet rays to which window glass is only slightly permeable, are nevertheless sufficiently transmitted to the intermediate layer so that it deteriorates rapidly in tropical or very sunny regions. Both the use of vanadium glass to prevent this, and the use of vanadium compounds in the intermediate layer, have been patented.

[1] *Journal of the Society of Chemical Industry,* Vol. 48.

Making Glass From Nepheline

A press report from Leningrad, Russia, states that a glass factory in that city has been making glass from nepheline, an aluminum silicate, which it is claimed does not require mixture with soda and sulphate. Nepheline is one of the "accessory" minerals, i. e., one of the minor and not-always-present components, of sundry igneous rocks. It is widely distributed, but nearly always is present only in very small amounts.

Occasionally it occurs massive, i. e., in large lumps and in quantity, as feldspar does in Canada.

There is no obvious reason why nepheline should not be used in making glass, nor any reason why glass should not be melted in platinum crucibles, except that both nepheline and platinum are comparatively rare in most parts of the earth. Probably Russia possesses more than her share of both, but we would be quite willing to leave all the nepheline in Russia if we could get a little more platinum.—*F. W. P.*

The Rate of Crystal Growth in Technical Soda-Lime-Silica Glasses

By DR. ADOLF DIETZEL*

Translated by K. H. Lunde and F. W. Preston

(*Continued from the May issue*)

GLASS No. 4

Na_2O 11.99%, CaO 12.05%, SiO_2 75.72%, Al_2O_3 etc. 0.24%

TABLE VII

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
800°	20	45 50 52	49	2.5	Wollastonite
900°	10	145 148 153 154	150	15.0	Wollastonite
950°	15	176 180 190	182	12.1	Wollastonite
975°	10	85 92	89	8.9	Wollastonite and Cristobalite
1000°	5	50 52 55 56	53.2	10.2	Cristobalite
1050°	10	194 194 201 205	199.2	19.9	Cristobalite
1100°	10	240 250 250	246.6	24.7	Cristobalite
1150°	10	112 118 120 125	118.7	11.9	Cristobalite

Temperature of Most Rrapid Growth 1085° C.
Maximum Rate of Growth 25.5 μ/min.
Softening Temperature 950° C.
Figures 22 and 23 show the precipitation in 10 minutes @ 975° and 1100° C.
For curve see Fig. 24.

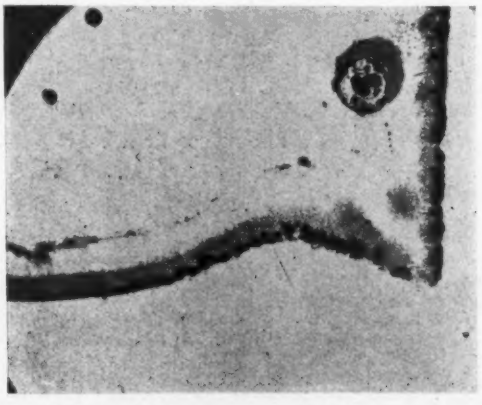


FIG. 22. GLASS NO. 4 975°—CRISTOBALITE AND WOLLASTONITE

FIG. 23. GLASS NO. 4 1100°—CRISTOBALITE

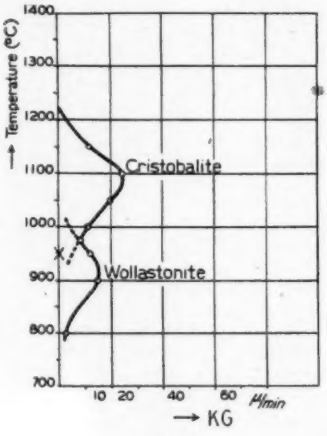


FIG. 24

GLASS No. 5

Na_2O 11.95%, CaO 14.00% SiO_2 73.90%, Al_2O_3 etc. 0.14%

TABLE VIII

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
900°	10	56 60 62	59.3	5.9	Wollastonite
950°	10	125 128 130 132	12.9	12.9	
1000°	10	127 135 135 138	133.7	13.4	
1050°	10	58 61 62 65	61.5	6.2	Wollastonite and
		98 104 105 107	103.5	10.4	Cristobalite

* A communication from the Silicate Laboratories of the Institute for Chemical Technology, Karlsruhe Technical School; published in Sprechsaal (Coburg) 1929.

Temperature of Most Rapid Growth 975° C.
Maximum Rate of Growth 15 μ/minute.
Upper Limit of Devitrification 1142° C.
Softening Temperature 950° C.
For curve see Fig. 25.

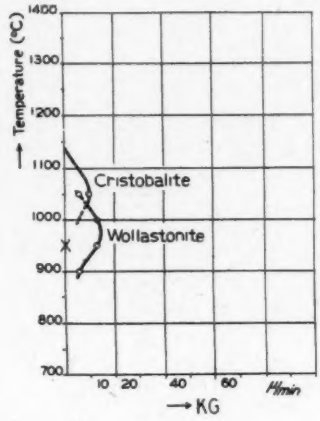


FIG. 25

GLASS No. 6

Na_2O 12.05%, CaO 16.07%, SiO_2 71.67%, Al_2O_3 etc. 0.21%

TABLE IX

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
900°	5	46 47 49 53	48.7	9.7	Wollastonite
950°	5	134 137 138 140	136.7	27.3	
1000°	5	158 165 175 175	168.2	33.6	
1050°	5	96 98 105 107	101.5	20.3	

Temperature of Most Rapid Growth 990° C.
Maximum Rate of Growth 34 μ/minute.
Softening Temperature 900° C.
For curve see Fig. 26.

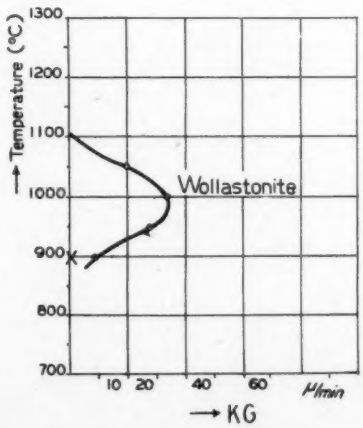


FIG. 26

GLASS No. 7

Na_2O 13.87%, CaO 6.05%, SiO_2 79.87%, Al_2O_3, etc. 0.21%

TABLE X.

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
950°	5	50 52 56 58	54	10.8	Cristobalite
1000°	5	87 93 96 97	93.2	18.6	
1100°	5	245 255 262 265	256.7	51.3	
1150°	5	264 268 273 274	269.7	53.9	
1200°	5	97 101 101 105	101	20.2	

Temperature of Most Rapid Growth 1125° C.
Maximum Rate of Growth 56 μ/ minute
Softening Temperature 1000° C.
For curve see Fig. 27.

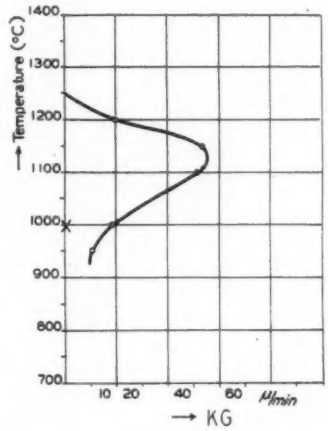


FIG. 27

GLASS No. 8

Na_2O 14.05%, CaO 8.63%, SiO_2 77.68%, Al_2O_3, etc. 0.24%

TABLE XI

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
1000°	5	70 75 75 76	74	14.8	Cristobalite
1050°	5	138 140 141 145	141	28.2	
1100°	5	166 167 169 175	169.2	33.8	
1150°	5	120 120 120	120	24.0	

Temperature of Most Rapid Growth 1100° C.
Maximum Rate of Growth 33.8 μ/minute.
Softening Temperature 950° C.
For curve see Fig. 28.

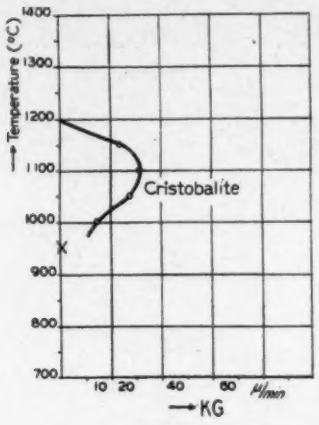


FIG. 28

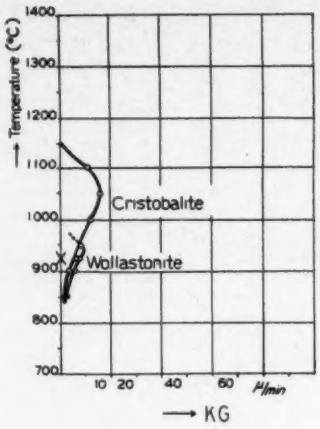


FIG. 29

GLASS No. 9

Na_2O 13.95%, CaO 10.02%, SiO_2 75.82%, Al_2O_3, etc. 0.21%

TABLE XII

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
850°	15	16 17 19	17.3	1.3	Cristobalite[15] and
		35 38 40	37.6	2.5	Wollastonite
900°	10	22 24 27	24.5	2.5	Cristobalite[16] and
		47 49 53	49.7	5.0	Wollastonite
925°	10	53 55 55 56	54.7	5.5	Cristobalite and
		69 69 70 71	70.0	7.0	Wollastonite
950°	5	34 35 35	34.7	6.9	Cristobalite and
		34 36 37	35.7	7.1	Wollastonite
1000°	5	58 59 61 61	59.8	12.0	Cristobalite
1050°	5	74 76 76 77	75.7	15.1	
1100°	5	49 51 53	51.0	10.3	

Temperature of Most Rapid Growth 1055° C.
Maximum Rate of Growth 15.3 μ/minute.
Softening Temperature 950° C.
For Curve see Fig. 29.

GLASS No. 10

Na_2 13.93%, CaO 12.01%, SiO_2 73.94%, Al_2O_3, etc. 0.12%

[15]Tabular habit.
[16]Fern-like structure.

TABLE XIII

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
900°	10	62 64 65 70	65.2	6.5	Wollastonite
950°	10	126 126 128 130	127.5	12.8	Wollastonite and
		52 52 55 57	54	5.4	Cristobalite
975°	10	48 50 55 56	52.2	5.2	Wollastonite and
		62 65 66 70	65.7	6.6	Cristobalite
1000°	5	32 34 35	33.6	6.7	Cristobalite

Temperature of Most Rapid Growth 945° C.
Maximum Rate of Growth 15.5 μ/minute.
Softening Temperature 900° C.
Figure 30 shows a sample devitrified for 10 minutes at 950° C., as seen by direct observation.
Fern-like growths of Cristobalite and needles of Wollastonite may be recognized.
For curve see Fig. 31.

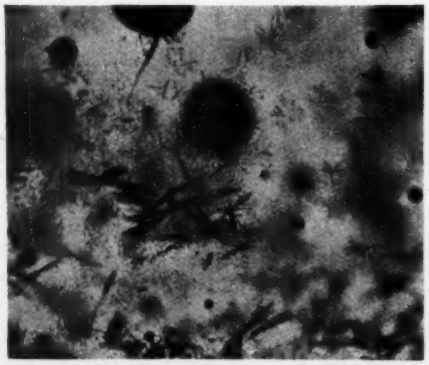


FIG. 30. GLASS NO. 10, 950° FERN-LIKE GROWTHS OF CRISTOBALITE AND BUNCHES OF WOLLASTONITE

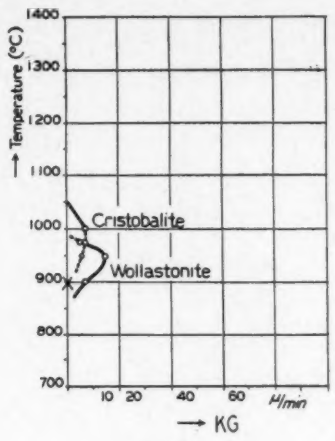


FIG. 31

GLASS No. 11

Na_2O 14.03%, CaO 14.06%, SiO_2 71.65%, Al_2O_3, etc., 0.26%

TABLE XIV

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
850°	10	19 20 20	20	2.0	Wollastonite
900°	5	64 68 71 72	68.7	13.7	
950°	5	135 142 144 145	141.4	28.3	
1000°	5	148 150 155	151	30.2	

Temperature of Most Rapid Growth 980° C.
Maximum Rate of Growth 32 μ/minute.
Softening Temperature 900° C.
For curve see Fig. 32.

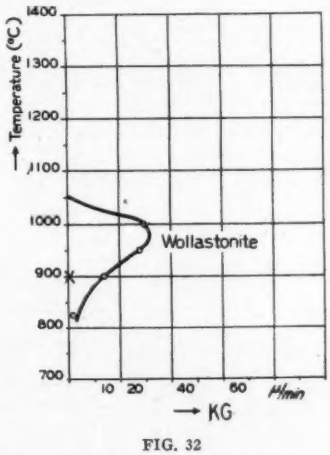


FIG. 32

GLASS No. 12

Na_2O 13.97%, CaO 15.98%, SiO_2 69.92%, Al_2O_3, etc., 0.13%

TABLE XV.

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
900°	10	340 348 355	347.6	34.8	Wollastonite
950°	5	305 315 315	311.6	62.3	Wollastonite and
		72 73 78	74.3	14.9	Pseudowollastonite
970°	5	350 355 357	354	70.8	Wollastonite and
		86 93 94	96	18.3	Pseudowollastonite
1000°	5	294 312 315	307	61.4	Wollastonite and
		95 95 97	95.7	19.1	Pseudowollastonite
1050°	10	142 149 155 155	150.2	15.0	Wollastonite

Temperature of Most Rapid Growth 980° C.
Maximum Rate of Growth 70.8 μ/minute.
Softening Temperature 900° C.
For curve see Fig. 33.

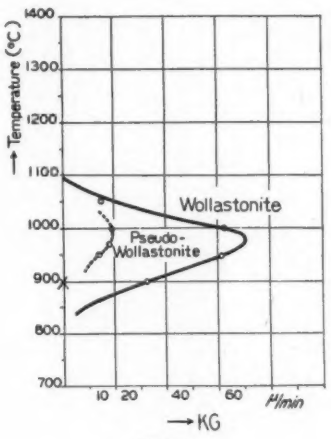


FIG. 33

GLASS 13

Na_2O 15.92%, CaO 5.98%, SiO_2 78.95%, Al_2O_3, etc., 0.15%

TABLE XVI.

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
950°	10	64 68 75	69	6.9	Cristobalite
1000°	10	80 82 85	82.3	8.2	
1050°	5	94 95 102 103	98.5	9.9	
1100°	5	105 108 113 115	110	22.0	

Temperature of Most Rapid Growth 1080° C.
Maximum Rate of Growth 25 μ/minute.
Softening Temperature 950°.
For curve see Fig. 34.

GLASS No. 14

Na_2O 15.95%, CaO 8.10%, SiO_2 75.85%, Al_2O_3, etc., 0.10%

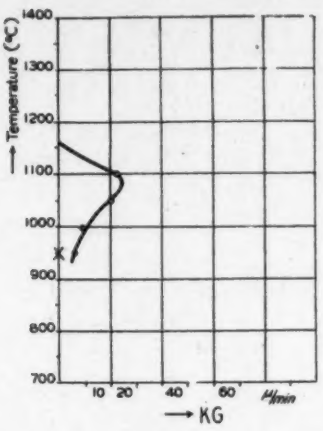


FIG. 34

TABLE XVII.

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) 1μ=.001 mm.	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
950°	10	36	39.2	3.9	Cristobalite
		39			
		40			
		42			
1000°	10	97			
		98	98.8	9.9	
		100			
		100			
1050°	15	70			
		71	73.5	4.9	
		75			
		78			

Temperature of Most Rapid Growth 1050° C.
Maximum Rate of Growth 10.5 μ/minute.
Softening Temperature 900°.
For curve see Fig. 35.

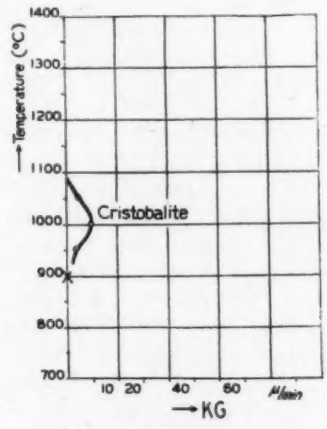


FIG. 35

GLASS No. 15

Na_2O 15.97%, CaO 10.08%, SiO_2 73.76%, Al_2O_3 etc. 0.19%

TABLE XVIII

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) (1μ=.001 mm)	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
800°	20	26			
		27	28.5	1.4	Cristobalite[17]
		30			
		31			
850°	20	67			
		69	71	3.6	Cristobalite
		73			
		75			and
		37			
		37	37	1.8	Wollastonite
		38			
		39			
875°	7	41			
		42	41.5	6.0	Cristobalite
		23			and
		24	23.5	3.4	Wollastonite
900°	10	73			
		73	73.3	7.3	Cristobalite
		74			
		63			and
		65	64.7	6.5	Wollastonite
		66			
910°	10	73			
		75			
		76	75.0	7.5	Cristobalite[18]
		76			and
		70			
		71			
		71	71.2	7.1	Wollastonite
		73			
925°	20	145			
		148	147	7.4	Cristobalite
		149			and
		97			
		98	99.3	4.9	Wollastonite
		103			
950°	20	98			
		103	102	5.0	Cristobalite
		105			and
		18			
		21	21	1.0	Wollastonite
		24			

Temperature of Most Rapid Growth 920° C.
Maximum Rate of Growth 7.6μ/minute.
Softening Temperature 900° C.
For curve see Fig. 36.

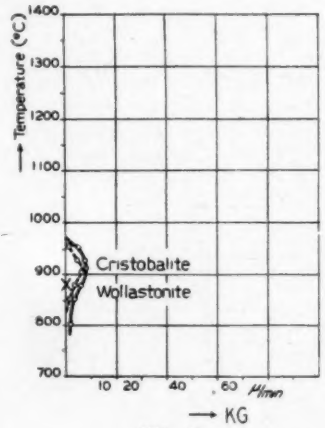


FIG. 36

GLASS No. 16

Na_2O 15.92%, CaO 12.02%, SiO_2 71.84%, Al_2O_3 etc. 0.21%

TABLE XIX.

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) (1μ=.001 mm)	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
850°	10	28			
		31	29.5	3.0	Cristobalite
875°	10	57			
		60	58.5	5.9	Wollastonite
					and
					Cristobalite[19]
900°	10	124			
		129			
		133	130.5	13.1	Cristobalite
		44			and
		45	45	4.5	Wollastonite

[17] Tabular habit.
[18] Fern-like growth.

		45			
		46			
925°	10	164			
		167	167.2	16.7	Wollastonite and Cristobalite[10]
		168			
		170			
950°	10	117			
		122	121.3	12.1	Wollastonite and
		125			
		11			
		13	12.7	1.2	Cristobalite
		14			

Temperature of Most Rapid Growth 925° C.
Maximum Rate of Growth 16.7 μ/minute.
Softening Temperature 875° C.
For curve see Fig. 37.

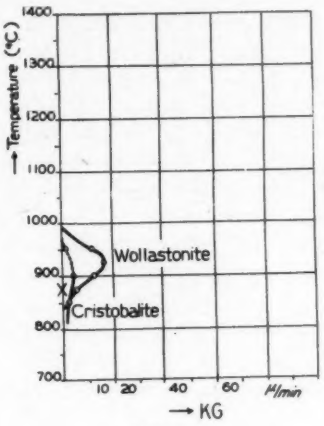


FIG. 37

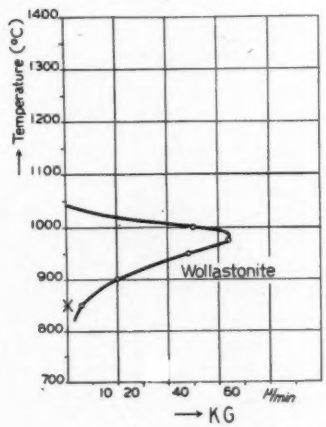


FIG. 38

GLASS No. 17

Na_2O 15.96%, CaO 13.97%, SiO_2 69.93%, Al_2O_3 etc. 0.14%

TABLE XX.

Devitrification Temp. °C.	Devitrification Time (Minutes)	Resulting Crystal Length (μ) (1μ=.001 mm)	Average	Rate of Growth μ/minute	Crystal Phase Precipitated
850°	10	57			
		59	60.3	6.0	Wollastonite
		65			
900°	5	93			
		98	98.6	19.7	
		105			
950°	5	232			
		237	240	48.0	
		245			
		246			
975°	5	320			
		321	322.6	64.5	
		327			
1000°	10	485			
		497	497.3	49.7	
		510			

[10] Most measured.

Temperature of Most Rapid Growth 980° C.
Maximum Rate of Growth 64.7 μ/minute.
Upper devitrification limit 1040° C.
Softening Temperature 850° C.
For Curve see Fig. 38.

(*To be continued*)

The Analysis of Green Chrome Oxide

By S. R. SCHOLES[1]

Chromium oxide, because of its refractory, insoluble character, presents analytical difficulties. The methods given in text-books for getting this material into solution are unsatisfactory and also destructive of platinum crucibles.

The method described here consists of a low-temperature fusion with sodium nitrate and sodium hydroxide, separation of chromate as barium chromate, and titration with potassium ioxide and thiosulphate in acid solution.

Weigh 0.1 g. chrome oxide into a platinum crucible, and add 0.5 g. sodium nitrate and 0.5 g. pure caustic soda. Heat to quiet fusion over a small bunsen flame. A two-inch flame with the bottom of the crueible an inch above the tip of the flame is satisfactory. There should be no gas-evolution. The temperature is between 300 and 400°C. After 30 to 60 minutes, the reaction is complete, as shown by the disappearance of all dark particles and the formation of a clear amber melt of sodium chromate dissolved in the fusion mixture.

If this fusion is properly done, the attack on platinum is negligible. A loss of .0005 has been found, after two such melts.

The melt is cooled and dissolved in 50 c.c. water. Barium chloride solution is added to complete precipitation of chromate and carbonate. The purpose of this procedure is to get rid of nitrite, which upon making the solution acid forms nitrous acid. This liberates iodine from potassium iodide, and makes iodimetric titration impossible.

The mixed precipitates of barium chromate and barium carbonate are caught on a filter and washed. Place the paper in a beaker, add 100 c.c. water, and make distinctly acid with hydrochloric acid. Add about ½ gram of potassium iodide, and titrate the liberated iodine with N/10 sodium thiosulphate, using starch indicator. Care is necessary to avoid confusing the green color of the chromic solution for the starch-iodide color. 37-39 c.c. of standard solution will be required for good chrome oxide samples.

1 cc. N/10 Thio. = .00253 g. Cr_2O_3.

If a more complete analysis for impurities such as silica is desired, a 1.0 gram sample is taken, with 3 grams each of nitrate and caustic. After dissolving from the crucible in a porcelain dish, add hydrochloric acid. This converts the chromate to chromic chloride. Silica may now be separated by evaporation, and the bases tested for in the usual manner.

Small amounts, up to 1%, of water-soluble salts may be found in green chrome oxide. Unchanged bichromate, used as a source of the oxide, is the principal soluble impurity.

[1] Fostoria Glass Company, Moundsville, W. Va.

Glass Industry

ESTABLISED 1920

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H. L. Dixon

MAY the third saw the passing of an outstanding figure in the American glass industry when the founder of the H. L. Dixon Company died after a long period of failing health.

His father was of English birth, and was concerned in some of the earliest American ventures in glasshouse refractories. In Henry's early days, when his father's business in the old Dixon Works company went to the wall, the young man started in and paid off the creditors. Later he himself lost everything, but again staged an equally effective comeback, paid off his creditors, and ran a successful business from that time onwards.

To H. L. Dixon above all men Pittsburgh owes its Syrian Mosque, which is more than a masonic temple, and serves as a grand opera house and much besides. In 1913 there was available only a very small sum of money and a small piece of property. It was the general opinion that nothing could be done, but Henry said it could and would. It cost half a million and Henry financed it on $50,000. The building was dedicated in 1916, and on December 1, 1923, the entire debt was paid off, and the property had more than doubled in value. In its construction he was no autocrat, but though in charge of the whole business, diligently consulted with all interested as to their needs and wishes. On January 1, 1916, the entire line of officers stood aside and elected Henry Dixon from the floor to be Potentate, a thing that had never happened in the history of the association.

In his business relations the tall engineer was fortunate, but he owed his fortune to his own integrity. He made mistakes—lots of them—for he was not really a glass man, nor a physicist, and he was pioneering the development of processes and equipment for a wayward and intractable material whose nature was far from being understood. But glass men trusted him, often on quite risky ventures, for they felt that if the work proved unsatisfactory, Dixon would stand behind it and make it right, if it cost him his last penny. In this he was carrying on the tradition of his fathers, and the business value of such a reputation in an age when sharp practice was the rule went far to make Dixon's career the success it was.

The honor and honesty he showed in these matters, the courage he showed in the matter of the Mosque and on many other occasions, and the blend of kindliness with strength in his personality will not soon be forgotten by our generation.

Detects the Obscure Secrets of Glass

WE are informed that on the best authority that Sherlock Holmes once solved a murder by analyzing the ashes from a cigar, and so deciding the brand of tobacco used by the murderer.

More frequently, murderers are traced by microscopic examination of the scratches on their bullets, whereby the gun that fired them may often be identified.

Expert analysis of the peculiarities of handwriting, and still more the irregularities of typing, has often been the undoing of the criminal.

It is recorded of the great naturalist, Louis Agassiz, that he used to give his pupils a fish to look at for several days;

they were supposed to observe all that was observable about it, and when they had seen everything, to report to him. Usually in an hour or so, they thought they had it all, and were surprised to find, on interviewing their professor, that they had not even begun to see the fish. The performance would be repeated, until after several days, it was sufficiently impressed on the student how much there was to be seen by diligently looking at things.

In the present issue Roy Swain sketches briefly the "marks of the beast," whereby the mode of manufacture of glassware may be determined by the initiated. Details of workshop practice, jealously guarded as secrets in some cases, are often announced to the world in this way, and what we whisper in the ear is proclaimed upon the house tops, or at least in the house walls and on the table tops.

There is much amusement and instruction to be gained by taking any article of glassware, or for that matter any other ware, and by the marks upon it, and by the design and construction, deciphering the various processes through which it has gone, and any kinks or peculiarities in the manufacturing process. This playing the detective is often a profitable exercise, not merely or even principally in finding out what the other fellow is doing but in suggesting new principles in the design and manufacture of similar, or even very dissimilar, wares.

Meeting of the American Refractories Institute

The American Refractories Institute held its annual meeting at White Sulphur Springs, W. Va., May 19 and 20. There were no presentations of technical papers this year, the meeting being given over entirely to business and the annual election of officers and directors. Those chosen for office were:

President, W. J. Westphalen, Vice President, Laclede-Christy Clay Products Co., St. Louis; First Vice President, W. B. Coullie, General Sales Manager, Harbison-Walker Refractories Co., Pittsburgh; Second Vice President, P. S. Kier, Vice President, Kier Fire Brick Co., Pittsburgh; Treasurer, C. C. Edmunds, Vice President, McLain Fire Brick Co., Pittsburgh; Secretary, Miss Dorothy Texter, 2218 Oliver Building, Pittsburgh.

Directors to serve during the term 1930-33: J. M. McKinley, Vice President, North American Refractories Co., Cleveland; W. B. Coullie, General Sales Manager, Harbison-Walker Refractories Co., Pittsburgh; C. C. Edmunds, Vice President, McLain Fire Brick Co., Pittsburgh; R. A. Hitchins, Secretary, General Refractories Co., Philadelphia; W. H. Peterson, Vice President, M. D. Valentine & Bro. Co., Woodbridge, N. J.; Chas. S. Reed, President, Chicago Retort & Fire Brick Co., Chicago; R. M. Sievers, District Sales Manager, Harbison-Walker Refractories Co., St. Louis; W. J. Westphalen, Vice President, Laclede-Christy Clay Products Co., St. Louis.

Some time ago the Institute issued a little booklet containing the code of ethics recently adopted by the refractories industry. This code covers practices relating to discounts and credits, rebates, misbranding, service guarantees, type and validity of contracts, standard proposal forms, commissions, dealer classifications, breakage claims, commercial bribery, brands and trade marks, and general practices.

Another of the Institute's projects was the organization not long ago of a Research Committee about which Donald Ross of the Findlay Clay Products Company at Washington, Pa., can give those interested full information.

New Beryllium Deposits

General Electric Corporation is reported to have secured a controlling interest in beryllium ore deposits recently discovered near Koflach in Steirmark, Austria. It is reported that the company has decided to shut down its Dakota mine in the opinion that the Austrian deposits will supply the world's needs.

Technical Consultation Service

Natural Glass

QUESTION 118.—*Is glass ever found in natural formation?*
ANSWER.—*Glass is a man-made product.*

The above question and answer appeared on April 5 in a Pittsburgh newspaper.

We consider the answer very misleading. The questioner has evidently heard of natural glass, and asks if such a thing exists. It does. Many volcanic lavas are partly or wholly glassy. Obsidians and pitchstones, for instance, are commonly described, and correctly, as natural glass. They are of course generally deeply colored, but that is a property shared by many man-made glasses. Further, many of the other volcanic rocks, such as basalt, occur quite frequently in the form of colored glass with an admixture of crystals. Like many glasses from an industrial tank, these natural glasses often show "flow-lines" or striae. There is no doubt that the amount of natural glass in the world vastly exceeds the total of the man-made product.—*F. W. P.*

A LANDSCAPE OF NATURAL GLASS
OBSIDIAN (GLASS) CLIFF IN YELLOWSTONE NATIONAL PARK

Obsidian is a highly vesicular volcanic glass (lava froth) produced by the extravasation of water vapor at a high temperature as the lava comes to the surface. It consists mainly of aluminum silicate. It is used in commerce as pumice stone, the abrasive.

The glassy character of obsidian is indicated, as may be discerned in the picture, by the shadows thrown on it by the sun. They are not solid black as are ordinary rock shadows but reflect a peculiar transparent or translucent effect.

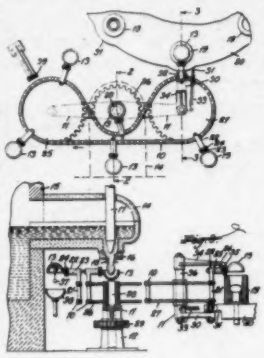
In the 18th century obsidian was frequently imitated in black glass. There arose at that time among collectors of gems the curious practice of calling all antique pastes obsidian.

Recent Patents

NEW INVENTIONS DESIGNED TO IMPROVE GLASS AND THE MEANS OF PRODUCING IT

Complete copies of U. S. Patent Specifications may be obtained from the Commissioner of Patents, Washington, D. C., Price 10c each

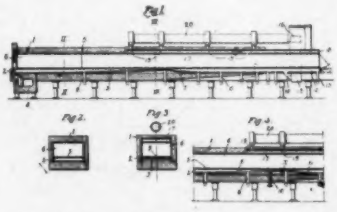
APPARATUS FOR DELIVERING MOLTEN GLASS. U. S. 1,756,492. Apr. 29, 1930. Karl E. Peiler, West Hartford, Conn., assignor to Hartford Empire Company, Hartford, Conn. Filed 6/24/26. In the invention, a carriage is mounted beneath the feeder, for pivotal movement upon a vertical axis, in alignment with the feeder outlet. This carriage is arranged to extend from the feeder to the mold table of the shaping machine and supports a continuously moving conveyor of suitable construction to carry a plurality of mold-charge receptacles. The conveyor is operated at a uniform rate of speed and the movements of the conveyor and of the carriage are coordinate in such a manner that the travel of each mold charge receptacle is arrested at the feeder outlet to receive a mold charge. After receiving the charge, the receptacle with its mold charge is conveyed to a position above the moving mold, and the mold table actuates the carriage in such a manner that the moving receptacle on the conveyor moves in coincidence with the mold on the rotating table for a sufficient time to permit the receptacle to effect the discharge of its mold charge without distorting the mold charge during its delivery into the mold.



COLORED HEAT-RESISTING GLASS. U. S. 1,754,182. Apr. 8, 1930. William C. Taylor, Corning, N. Y., assignor to Corning Glass Works, Corning, N. Y. Original application filed 6/12/26. Divided and this application filed 6/10/26. High transmission colors in low expansion boro-silicate glasses have been heretofore unobtainable, except in the case of reds and yellows produced by cadmium sulphide and selenium. These reds and yellows are difficult to exactly control, because of change in hue and intensity due to melting conditions and heat treatment.

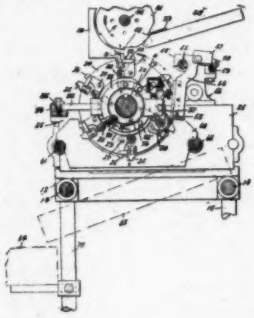
This invention is directed, therefore, to obtaining a low expansion boro-silicate glass, which can be colored by the usual coloring oxides, to obtain colors of the same nature as those obtainable with such oxides when used with basic glasses. The invention consists in using from 1½ to 3 per cent of lithia for fluxing; an equal or greater amount of potash to prevent crystallization and improve color; about 1 to 3 per cent alumina to prevent crystallization; a percentage of boric oxide depending on the amount of alkali used, the amount not to exceed twice the per cent of total alkali; and the balance silica and coloring oxides, the silica being over 79 per cent of the base glass in order to obtain sufficiently low expansion.

APPARATUS FOR ANNEALING GLASSWARE. U. S. 1,754,193. April 8, 1930. Thomas Wardley, Greenford, and Harold V. E. M. Renn, West Ealing, England, assignors to Hartford-Empire Company, Hartford, Conn. Filed 6/21/28. It is well known that the greater the speed of hot gases flowing along the flue consequent, for example, upon a smaller cross section of the flue, the higher will be the temperature on the side heated by the gas with a resulting increase in the amount of heat transmitted. The inventors apply this principle to lehrs and our invention consists in so designing the flue or passage for the hot gases or other temperature controlling medium that a greater rate of heat transference from the flue to the tunnel or chamber containing the articles or ware can be effected at any desired section or sections of the lehr.



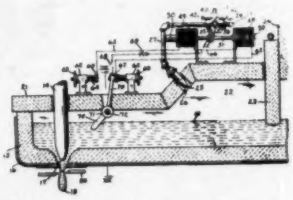
CUTTING APPARATUS FOR SHEET GLASS. U. S. 1,755,365. Apr. 22, 1930. Clifford A. Rowley, Chicago, Ill., assignor to Libbey-Owens Glass Company, Toledo, O. Original application filed 5/19/24. Divided and this application filed 4/1/29. An apparatus for transversely scoring a moving sheet of glass, comprising a carriage movable parallel with the movement of the sheet and including a guide bar extending transversely above said sheet, a cutter carrier having a slidable and rotatable fit on said guide bar, said carrier being provided with a housing, a tool holder mounted within the housing for vertical sliding movement with respect thereto, a cutting tool carried by and movable with said holder, spring means within the housing for normally urging the holder and tool upwardly away from the glass, and an operating handle carried by said holder and by means of which the holder may be lowered to move the tool into engagement with the glass.

MACHINE FOR CUTTING GLASS CANE OR TUBES. U. S. 1,754,143. April 8, 1930. Carl A. Brown and Andreas C. Nielsen, East Cleveland, O., assignors to General Electric Company. Filed 10/5/28. In an apparatus for subdividing lengths of glass cane or tubing, the combination of a cane or tube delivery means, a scoring means, a breaking means, a series of aligned chucks, means for supporting said chucks in position to receive a length of cane or tubing from said delivery means, and means for rotating said supporting means to cause said lengths to successively engage said scoring and breaking means.



COLORED HEAT-RESISTING GLASS. U. S. 1,754,065. Apr. 8, 1930. William C. Taylor, Corning, N. Y., assignor to Corning Glass Works, Corning, N. Y. Filed 6/12/25. This invention obtaining a low expansion boro-silicate glass, which can be colored by the usual coloring oxides, to obtain colors of the same nature as those obtainable with such oxides when used with basic glasses. The following is a typical glass embodying this invention which may be used as a base to which the desired oxides may be added for coloring: SiO_2, 82.6; B_2O_3, 8.8; K_2O, 3.4; Li_2O, 3; Al_2O_3, 2.2. The linear expansion of this glass is between .0000035 and .0000040.

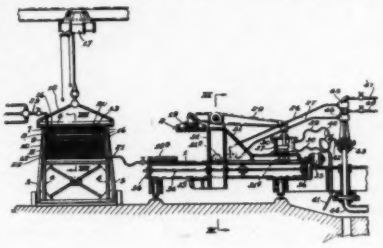
GLASS-FEEDER. U. S. 1,750,973. March 18, 1930. Leonard D. Soubier, Toledo, O., assignor to Owens-Illinois Glass Company, Toledo, O. Filed 2/16/27. A glass feeder comprising in combination, a container for a moving body of molten glass, heating devices extending into the container, a valve controlling flow of fuel to the heating devices, electrical mechanism for actuating the valve, and means actuated by the glass within the container in response to variations in the viscosity of glass to cause operation of said mechanism.



FEEDING MOLTEN GLASS. U. S. 1,755,/92. Apr. 22, 1930. Karl E. Peiler, West Hartford, Conn., assignor to Hartford-Empire Company, Hartford, Conn. Filed 11/7/24. The container is provided with a lateral discharge outlet submerged by the molten glass, and a discharge spout is connected to receive the glass through this lateral outlet and to deliver the glass through a downwardly opening orifice outside of the glass container. An impeller is mounted to reciprocate in the glass in the container toward and

from the lateral discharge outlet. The impeller causes glass to be discharged periodically from the outer end of the spout, and mold charges are severed from the discharged glass by means of suitable shears. Other novel features relate to the specific construction of the spout as closed channel which is curved outwardly and downwardly and may be of slightly decreasing diameter; the provision of means for keeping the spout at a suitably elevated temperature; and the construction and manner of operation of the impeller.

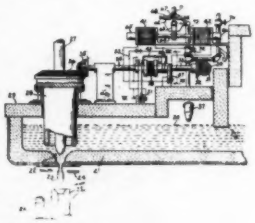
APPARATUS FOR MAKING COMPOSITE GLASS. U. S. 1,754,853. Apr. 15, 1930. John H. Fox and William Owen, Pittsburgh, Pa., assignors to Pittsburgh Plate Glass Company. Original application filed 12/17/26. Divided and this application filed 8/1/28.



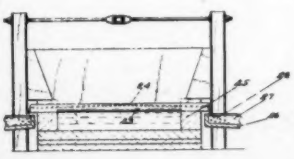
Apparatus for making composite glass, and particularly means for applying heat and pressure to cause the joinder between the glass and celluloid. Present application constitutes a division of application, Serial No. 155,425. Primary objects are the provision of a means whereby a plurality of composite plates may be formed simultaneously, and whereby quantity production may be secured with a limited number of operatives. The inventor claims apparatus for applying pressure to a plurality of sets of glass sheets with interposed layers of reinforcing material comprising a carrier mounted for movement, a plurality of presses mounted on the carrier and each consisting of a base in fixed position on the carrier, and a presser head and power means therefor mounted on the carrier for movement transversely of the base, so that in one position the head lies over the base and in another position it lies to one side of the base.

APPARATUS FOR HANDLING GLASSWARE. U. S. 1,755,404. Apr. 22, 1930. Wilbur S. Mayers, Fairmont, W. Va., assignor by mesne assignments to Hartford-Empire Company, Hartford, Conn. Filed 12/30/22. In glassware handling apparatus, the combination with a carrier for the ware of a member moveable in a closed path adjacent to said carrier and having a differential motion with respect thereto, a deflector pivotally mounted on said member, and means for moving said deflector into and out of the path of movement of the ware on said carrier, said means including a cam removable to permit its replacement by a cam of different size, whereby the length of the operative stroke of said deflector may be varied.

MEANS FOR AUTOMATICALLY CONTROLLING THE TEMPERATURE OF MOLTEN GLASS. U. S. 1,750,967. March 18, 1930, John F. Rule, Toledo, O., assignor to Owens-Illinois Glass Company, Toledo, O. Filed 4/12/27. Means for controlling the temperature of molten glass, comprising a mechanical element in contact with the glass, means for moving said element, and means governed by the resistance of the glass to the movement of said element for controlling the application to the glass of a temperature regulating medium.



GLASS TANK. U. S. 1,751,045. March 18, 1930. Leopold Mambourg, Lancaster, O., assignor to Libbey-Owens Glass Company, Toledo, O. Filed 3/3/27. An invention to provide in glass apparatus, a tank furnace including a cooling chamber, said cooling chamber having an adjustable cap and a jack-arch having its lower end disposed beneath the surface of the molten glass passing thereunder so that sub-surface glass only will pass under said jack-arch, the upper stratum of glass being caused by said jack-arch to move toward the sides of the cooling chamber where it may be poured into receptacles containing water, thus forming cullet from said skimmed glass.



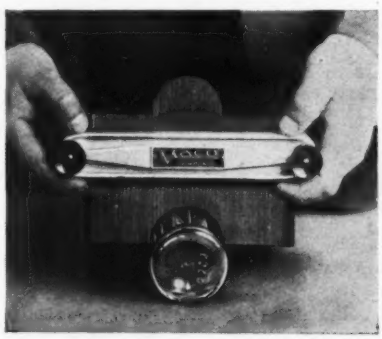
APPARATUS FOR GRINDING AND/OR POLISHING GLASS. U. S. 1,755,140. Apr. 15, 1930. Frederic Barnes Waldron, Prescot, England, assignor to Pilkington Brothers Limited, Liverpool, England. Filed 7/16/29 and in Great Britain 9/14/28. In apparatus for grinding or polishing plates or sheets of glass, the combination with a series of traveling tables on which the glass is laid and a series of grinding or polishing discs beneath which the tables are adapted to move continuously, of a roll of clean cloth located at the commencing end of the operative course of the tables, a rotatable mandrel within the roll, means adapted to unwind the cloth from the roll at the speed of travel of the tables, a rotatable mandrel located at the finishing end of said operative course, and means adapted to wind the cloth on to said mandrel at the speed of travel of the tables.

MACHINE FOR THE MANUFACTURE OF HOLLOW-BLOWN GLASS ARTICLES. U. S. 1,755,957. Apr. 22, 1930. Sydney Hunt, Birmingham, England. Filed 1/19/28. An object of the present invention is so to construct and operate a combined suction and blowing head that a wide range of plugs can be employed. A further object is to enable the plugs to be easily interchanged or replaced. Another object is to provide a simple and efficient valve mechanism for enabling the change over from suction to blowing through the head, or vice versa to be conveniently effected whilst preserving the air tightness of the head.

Unique Instrument for Measuring Contours

This instrument, the Maco template will, it is stated, give an instant and visible result which is perfectly measurable, and of which any number of records may be sent to any number of people.

When an exact template of any profile is required, it is only necessary to loosen the screws and gently press the adjustable template against the contour. The result of such pressure is that the laminae take a perfect outline of the surface against which they are pressed, their extreme thinness materially assisting in the facility and precision of the process. When the pressure is complete, by locking the screws, the laminae are held in position. From the template thus produced, other and permanent templates may be made, or a record of the section of the profile may be kept and filed for further reference.



THE MACO TEMPLATE TAKING THE CONTOUR OF A BOTTLE

Set in an aluminum frame or housing, this template is composed of a number of very fine strips of hard drawn brass, and is consequently rustless. The thickness of each strip is .007 in. These laminations are held in position by two special clamps, which are fitted with sections of corrugated rubber that insure the security of the laminae from falling out.

It can be applied to new work or in maintenance work where it is necessary to test wearing parts. For securing proper fitting in engineering work, especially of replacement parts which have to be fitted to machines at a distance from the place of production, this template is a useful measuring instrument, being both speedy and exact to .007 in.

This device is already in use in prominent glassware factories and glass machinery builders' plants. It is manufactured in Great Britain and marketed in this country by American Maco Template Co., Inc., 44 Whitehall Street, New York, of which Charles Mitchell is president.

Mirror Standardization Conference at Cincinnati

All Interested Are Invited to the Meeting, June 12

The movement among manufacturers, distributors, and users of mirrors and mirror plate toward the adoption by the trade of definite quality standards has come to a head. In compliance with a request from the Mirror Manufacturers Association, a meeting will be held under the auspices of the United States Bureau of Standards at 10 a.m., Thursday, June 12, 1930, at the Gibson Hotel, Cincinnati, Ohio, to consider the adoption of a standard that will be as acceptable as possible to all those directly concerned. The agenda for the general conference is published below at the request of Harry H. Steidle, Division of Trade Standards, Bureau of Standards.

All those interested are invited to be present and take part in the discussions. Mr. Steidle requests that he be notified in advance at the Bureau of Standards, Washington, D. C., by the firms which will be represented at the meeting as to the names of individuals designated to represent them, in order that adequate seating facilities may be provided.

Agenda for General Conference on Plate Glass Mirrors

Time: 10:00 A. M., Thursday, June 12, 1930.
Place: Gibson Hotel, Cincinnati, Ohio.

1. Call to order.
2. Outline of procedure for establishment of Commercial Standard.
3. Presentation of recommendations.
4. Discussion of Commercial Standard.
5. Formal vote of approval.
6. Set effective date:
   (a) for new production.
   (b) for clearance of existing stocks.
7. Shall certification plan be used?
8. Set revision interval.
9. Appointment of standing committee.
10. Request producers to record tangible benefits from standardization.
11. Promotion of export trade:
   (a) Do producers desire to promote foreign commerce?
   (b) On the basis of these standards?
   (c) Into what languages and in what priority should the Commercial Standard be translated?
   (d) Will the industry sponsor translation and distribution through our foreign trade representatives?
12. Adjournment.

Proposed Standards of Quality for Plate Glass Mirrors

I. Purpose

These standards of quality are proposed as a basis of common understanding for the industry. By their adoption it is hoped that interest may be revived in the use of better quality mirrors and that shipping costs, packing charges, and other expenses incident to exchanged merchandise, which occur through misunderstandings between buyer and seller, may be eliminated.

II. Scope

This specification covers plate glass mirrors of five distinct grades designated as AA, A, No. 1, No. 2, and No. 3 quality based on the presence of certain inherent defects found in glass which are herein described.

III. General Requirements

All mirrors sold as of standard quality shall be serviceable mirrors equaling or exceeding the quality designated for each grade.

The central area of the mirror in all cases should be more free from defects than the outer area.

The edges of all mirrors shall be clean cut and on those to be fitted into frames shallow chips not over 3/16 inch shall not be considered as defects.

IV. Detail Requirements

The several grades designated below shall comply to the requirements specified. For description of terms see glossary on page 3, and for method of inspection, see page 3 of agenda. [See below.]

AA Quality

AA quality mirrors shall be entirely free from major defects and as nearly perfect as it is possible to manufacture them. Only well distributed fine seed and small faint hair lines when not grouped shall be permitted.

A Quality

The central area of mirrors of this quality shall be free from major defects but may contain well scattered seed and short faint hair lines, when not grouped and occasionally very light short finish visible only on close inspection.

The outer area in addition to the foregoing may contain seed and short faint scratches when not grouped.

No. 1 Quality

The central area of mirrors of this quality may contain scattered seed, faint hair lines and light short finish.

The outer area in addition to the foregoing may contain short scratches and occasional strings not over 2 inches long. Bull's eye is permissible if not visible from front inspection.

No. 2 Quality

Mirrors of this quality may contain the following defects: Numerous scattered seed, occasional coarse seed, light reams, strings, light scratches, short finish if not torn, hair lines if not too densely grouped, and bull's eye if not visible from front inspection.

No. 3 Quality

Mirrors of this quality may contain all the defects inherent to plate glass.

Thickness

Plate glass mirrors of standard quality shall be between 3/16 and 5/16 of an inch thick. If specific thicknesses are ordered a variation of 1/32 inch plus or minus the given thickness shall be allowed.

Guarantee

For the guidance of the buying public, the complete understanding of furniture retailer and manufacturer, and the protection of the mirror manufacturer, the face of each standard grade mirror shall be accompanied with a sticker in the color designated below, with the following statement for each particular grade:

Red: "This mirror is of the highest grade obtainable and is guaranteed by its manufacturers to be of first quality as specified in Commercial Standard CS-30 for Mirrors issued by the U. S. Department of Commerce.

.....
(Name of Manufacturer)

White: "This mirror is of next to the highest quality obtainable, containing very minor blemishes that are almost imperceptible. It is guaranteed by the manufacturers to be of second quality as specified in Commercial Standard CS-30 for Mirrors issued by the U. S. Department of Commerce.

.....
(Name of Manufacturer)

Blue: "This mirror is of good quality containing some of the lesser defects inherent to plate glass mirrors. It is guaranteed by the manufacturers to be of third quality as specified in Commercial Standard CS-30 for Mirrors issued by the U. S. Department of Commerce.

.....
(Name of Manufacturer)

Green: "This mirror is of fair quality containing most of the defects inherent in plate glass mirrors, but is serviceable. It is guaranteed by the manufacturers to be of fourth quality as specified in Commercial Standard CS-30 for Mirrors, issued by the U. S. Department of Commerce.

.....
(Name of Manufacturer)

Yellow: "This mirror may contain all of the defects inherent in plate glass mirrors. It is classified as of fifth quality as specified in Commercial Standard CS-30 for Mirrors, issued by the U. S. Department of Commerce.

.....
(Name of Manufacturer)

Silvering

The silvering of all standard quality mirrors shall be done in an approved manner and guaranteed for a period of one year from the date of manufacture unless the mirrors are subjected to unusual conditions such as open weather, moist walls, steamed rooms, direct sunlight, etc.

V. METHOD OF INSPECTION

It is desirable that a uniform method of inspection be followed since the distance from the mirror being examined, the angle between it and the line of sight and the intensity of light, all affect the visibility of imperfections.

The mirror should be examined in an indirect light of medium intensity with the inspector's eye on a level with the center of the plate and about 36 inches away.

VI. GLOSSARY OF TERMS

Bubbles—Gas inclusions, generally spherical and brilliant in appearance and larger than 1/32 inch in diameter.

Open Bubbles—Those which have been broken into by grinding, leaving a hemispherical hole in the glass surface. Also referred to as shot holes.

Bull's Eye—A wave or depression in the glass causing distortion of the vision.

Central Area—That portion of the mirror considered to form an oval or circle centered on the piece whose axes or diameters do not exceed 80 per cent of the over-all dimension.

Feathers—Streaks or areas of finely divided opaque foreign material mixed with numerous small bubbles or seed. They appear as a mass of specks due to the inclusion of foreign material in the batch or to incomplete skimming of pot before pouring.

Fire Cracks—Small cracks penetrating the surface of the plate, usually the shape of short hooked crescents, caused by sudden heating or chilling of the glass surface.

Hair Lines—Very faint lines on either surface of the glass.

Major Defects—The following are considered major defects: Bubbles, Bull's Eye, Fire Cracks, Feathers, Ream, Scratches, Coarse Seed, Heavy Seed, Open Seed, Short Finish, Skim, Stones, Strings, Open Bubbles.

Minor Defects—The following are considered minor defects: Fine Seed, Scattered Seed, Light Short Finish, and Hair Lines.

Ream—An area of strings or of non-homogeneous glass incorporated in the plate, appearing as a knotty, hairy mass, mixed with clear glass.

Scratches—Any marking or tearing of the surface, appearing as though it had been done by either a sharp or rough instrument.

SEED

Seed—Minute bubbles less than 1/32 inch in diameter. Seed are inherent defects in the best quality of plate glass.

Coarse Seed—Those between 1/64 inch and 1/32 inch in diameter.

Fine Seed—Minute bubbles less than 1/64 inch in diameter.

Heavy Seed—A condition where fine or coarse seed are very numerous, such as 25 or more to the square inch.

Open Seed—Those which have been broken into by grinding, leaving a hemispherical hole in the glass surface.

Scattered Seed—Indicates a condition of few and occasional easily visible coarse seed. Two or three may be spaced 1 or 2 inches from each other, but one here and there at much greater distances apart is the usual intention of the term.

Short Finish—Poor polish, lack of smoothness or improperly finished surface which has the appearance of being slightly pitted and wavy when the surface is viewed in reflected light.

Light Short Finish—A condition of short finish (insufficient finish, lack of brilliancy) visible only upon close inspection.

Skim—Streaks of dense seed with accompanying small bubbles.

Stones—Any opaque or partially melted particles of rock, slag or batch ingredient imbedded in the glass.

Strings—Light, wavy transparent lines on the surface appearing as though a thread of glass had been incorporated into the sheet.

New Mill in Quebec to Grind Feldspar

A mill for grinding feldspar, which at present is sent from this district to the United States in crude form, is to be erected in Buckingham, Quebec, according to the Montreal *Gazette* of March 5, 1930. Interests associated with M. J. O'Brien (Ltd.), whose mines in this district have for nine years been the largest Canadian producers of this mineral, have completed plans for the mill, it was announced recently. Flint and quartz, mined in large quantities in the Buckingham and Gatineau areas, also will be ground at the new mill. —*Foreign Trade Notes, No. 285, Dept. of Commerce.*

Successful Marketing of Motor Oil in Glass

Definite successes by two large companies in marketing their motor oils in glass bottles is being viewed with considerable interest by the glass container industry. The experiments conducted in selected areas have proved so satisfactory that plans are under way for widening the scope of the new method.

Leaders in the glass container manufacturing industry see in these results an extensive and hitherto untouched market for their products, it having been conservatively estimated that the motor oil trade, if developed, would consume yearly many thousand glass containers.

SEALED GLASS CONTAINERS Guarantee the Quality of the Oil

Two large manufacturers already have designed and produced bottles with which the preliminary tests were made and which thus far have proved satisfactory to the oil refiners and distributers. Still other designs are in process and it is predicted that numerous tests will be made of these offerings in an effort to determine the type of bottle best suited for handling oils.

The bottles already in use are eighteen inches tall, narrow and easy to manipulate within the intricate mechanisms of the various makes of automobiles. It has been found also that these bottles when crated for delivery are easily hauled and handled and that breakage is negligible; serving also for refilling and capable for making approximately one hundred trips, virtually negligible.

Encouraging reports of the recent developments are based on the attitude of both the refiner and distributor and the automobile public. Motorists have long been victimized through the substitution of inferior products bought under the name of nationally advertised oils. The new bottles insure not only full measure, but because of a metal cap which cannot be tampered with, guarantee that the customer is getting a 100 per cent pure product and exactly the grade he asks for.

The glass containers have proved themselves with the refiners and distributors also because they permit better regulated and more flexible marketing and closer relations with the retailers, at the same time eliminating credit risks and heavy bookkeeping expenses. The retailer may buy in smaller quantities and in doing so finds it to his advantage to pay cash for his deliveries. These practices are not possible under the old plan of large drum shipments.

In the experiments already conducted, the refiners have maintained central distributing stations where the oils were received in tank cars, as formerly, bottled by precise measurements, and shipped out in trucks to the retail trade. Empty bottles were returned to the central station, drained and thoroughly washed, then refilled and capped, and delivered again to sales points. Through this new method of operations the refiners have been assured that their products have been delivered to the consumer 100 per cent pure and the consumer is guaranteed against substitutes.

So successful have been the experiments thus far conducted that plans are already being made for extending the uses of the glass containers. "Our experience," says an official of one of the oil companies, "over a limited period has justified the development of selling motor oil in sealed bottles and the company has widened the scope of its marketing plans."

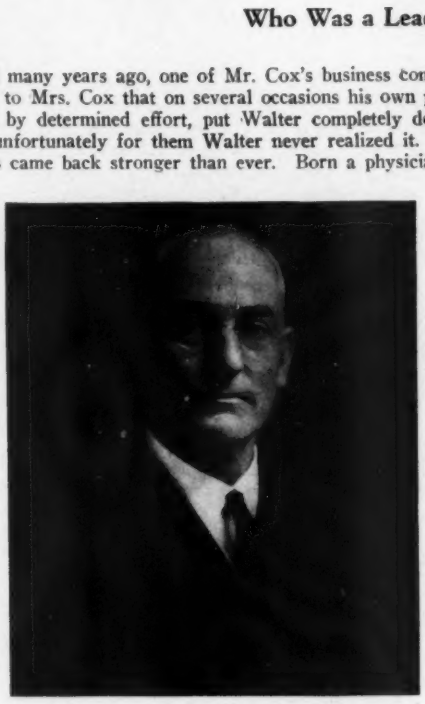
Mellon Institute Will Erect New Building

Dr. Edward R. Weidlein, director of Mellon Institute of Industrial Research, Pittsburgh, Pa., has announced for the Board of Trustees, that the institution is to increase its facilities for serving American industries by a building project that will enable the material expansion of all its research activities. Detailed plans are now being prepared by the architects, Janssen and Cocken, of Pittsburgh, and construction will begin as soon as the drawings are completed, early this fall. The Mellon-Stuart Company, also of Pittsburgh, is the general contractor.

Walter Cox

Who Was a Leader in the Wire Glass Industry

A good many years ago, one of Mr. Cox's business competitors remarked to Mrs. Cox that on several occasions his own powerful firm had, by determined effort, put Walter completely down and out, but unfortunately for them Walter never realized it. In fact he always came back stronger than ever. Born a physicial weakling, unable to walk until several years old, Walter Cox early set about with this same remarkable spirit of determination to become strong, and succeeded so well that he rowed upon the University of Pennsylvania's first crew.



WALTER COX

His characteristic of leadership had by this time also developed, since at the time of graduation he was president of his class, a class of which the University in later years became justly proud.

A man of such spirit and qualities could not be restrained to mediocrity, and quite naturally became an industrial leader. He was one of the pioneers of the wire glass industry, having been identified with it from its inception in America. In 1893, he was made secretary and treasurer of the American Wire Glass Company, and was an officer also of The Wire Glass Company. When, in 1901, a new process for the manufacture of wire glass was invented by Messrs. Shuman, the Continuous Glass Press Company, later the Pennsylvania Wire Glass Company, was organized. Mr. Cox was the first president of this company, and remained in that office until his death, in October, 1929, at the age of 72. He was chairman of the Rolled Glass Division of the War Industries Board.

Mr. Cox was not only an able business man, but helped to make history in glass technology, as indicated in part by a number of patents, but more particularly by actual results in the industry. Jointly with Arno Shuman, he originated corrugated wire glass, which, as shown in the accompanying illustrations, has resulted in a useful and increasingly popular new departure in methods of building construction. A number of years ago, he also had the vision to see in advance of the general industry that there was a need for a structural glass to moderate the heat and glare of the sun, particularly in industrial buildings. Together with associates, he developed such a glass commercially, and lived to see it in general use.

Although not himself technically trained, he was not, like so many of the older school of glass manufacturers, contemptuous of men so educated, but on the contrary was intensely interested in the encouragement of scientific achievement in a broad way. He was a loyal supporter of the Franklin Institute, and a member of the Society of Glass Technology until death.

Old personal friends and fellow members of Philadelphia clubs, could reminisce at great length of good times with Walter Cox. He never fell into the misfortune, like so many American business men, of becoming a slave to his business instead of its patron. It would have been useless for any business man, however important or influential, to attempt to make an appointment with Mr. Cox at his office on the first and third Wednesdays in any month from April to November. Those were Fish House Days, the full significance of which would be fully understood by any member of the Philadelphia aristocracy. While important business "cooled its heels," he would spend an entire Wednesday forenoon at Fish House on the Delaware, making a great cauldron of a certain soup of his own invention, described as "wonderful" by his congenial, epicurean disciples, some of them thirty years or more his junior. Nor would his interest in the soup—and the things which at the table precede or follow soup—cease when the finishing touches had been added to the cauldron. Had he not worked hard all morning that the afternoon might be enjoyed?

Aristocrat though he was, when the word of his passing reached the factory of the Pennsylvania Wire Glass Company, the genuine sorrow of the workmen was most impressive. All felt that a trusted friend had been lost.

INDOOR TENNIS COURT IN WHICH WIRE GLASS WAS EXTENSIVELY EMPLOYED FOR STRUCTURAL PURPOSES

Owner: Mrs. H. E. Talbot, Dayton, Ohio—Architect: Peabody, Wilson & Brown, New York.

Glass Manufacturing Industry Loses a Leader

Death of H. L. Dixon, Who Ably Helped to Rebuild the Industry Through Its Most Critical Period

The death at his home in Dormont near Pittsburgh on May 3 of Henry L. Dixon, most of whose life had been spent in the practical application and advancement of engineering principles to glass house construction and operation, and who became one of the most noted leaders ever in or affiliated with the glass manufacturing industry, will keenly revive in the memories of all connected with that industry, especially the older generation, their recollections as to what kind of man he was and what his accomplishments and services have meant to the industry.

Mr. Dixon was a man of broad sympathies and his attractive and admirable personal qualities together with his remarkable ability doubtless contributed largely to his popularity, for he was not only appreciated by the American industry, but had won also the high regard and respect of many foreign glass makers who had come in contact with him here or met him on his several trips abroad.

In his prime, Mr. Dixon was often referred to by his friends, and still is, as the "Dean" of the glass engineering profession, an appellation most appropriate and descriptive of his role in the industry.

Mr. Dixon grew up in the glass industry. He was born in Pittsburgh on October 19, 1860, the son of William S. and Augusta Dixon. That same year a firm, Thomas Coffin & Company, Ltd., was established to manufacture specialties for the glass house. In 1876 Mr. Dixon became connected with this company, associated with which at that time were also his father, a brother, an uncle and others. The company was superseded about ten years later by Dixon-Woods & Company, who specialized in the construction of glasshouse furnaces, making their own refractory blocks. This company furnished the blocks for the first window glass tank built in Pennsylvania, though not the first in this country. The Dixon-Woods Company was in turn succeeded by the Woods-Lloyd Company, manufacturers of tank blocks.

HENRY L. DIXON

About this time Mr. Dixon went to Europe to investigate the tank furnaces then in use and on his return started and during the following years built up a large business in the construction of window glass tanks which revoluticnized the melting of glass in that trade. A similar change took place in the bottle trade. He also built the first tank for melting flint glass, using producer gas as fuel. He was in the forefront in the development of other important practices affecting the processes of the industry.

Finally in 1902 Mr. Dixon with several associates incorporated the present H. L. Dixon Company and erected the plant now in use at the Rosslyn Station adjoining Carnegie, Pennsylvania, where the manufacture of glasshouse equipment has been carried on by the same company ever since. For some years Mr. Dixon had been chairman of the Board of the Citizens National Bank of Dormont. He was a very prominent thirty-third degree Mason and at various times held the highest offices in that and affiliated organizations in the Pittsburgh district.

Mr. Dixon was always quick to give his approval and encouragement to organizations and enterprises in which he had confidence, whose activities and aims he deemed likely to be beneficial to the trade. He or his company were active members of the regular glass trade organizations and of the American Ceramic Society and the Society of Glass Technology of England.

Surviving Mr. Dixon are his widow, Mrs. Catherine Stange Dixon, his son, Harry G., his sister, Mrs. Florence Sturgeon, and a brother, Charles E. Dixon.

In view of the interest manifested throughout the trade in Mr. Dixon's career a few expressions on that subject from a number of well known glass men are given here.

G. B. Hollister, Vice-President of the Corning Glass Works:

> "Our association with Mr. Dixon covered a period of a good many years. Whenever we had serious furnace troubles or were planning new melting units, our first thought was to call Mr. Dixon into consultation. He was always prompt to respond with excellent common sense advice and was of very great assistance to us. I well recall his quiet and direct approach to our problems and the confidence we had in his ability to solve them. During the period of rapid changes from hand fired to producer gas furnaces and from the early crude lehr construction to the more efficient forms, he kept himself thoroughly up-to-date in theory and practice.
>
> He was a pleasant man to do business with and an upright one and he filled an important place in the development of the industry."

Philip I. Heuisler, President of the Maryland Glass Corporation.

> "Our relationship with the late H. L. Dixon began almost a quarter of a century ago when as officers of the Emerson Drug Company we decided to embark in the glass business. With no knowledge whatever of the subject we turned the whole matter over to Mr. Dixon, who built and equipped our new plant. The success of the Maryland Glass Corporation from the very beginning justified our confidence. We have never ceased to regard him as a man of highest integrity, and value beyond expression the friendship which has lasted over the years."

Fred W. Stewart, H. C. Fry Glass Company:

> "I knew Mr. Dixon for over thirty-five years. He was a man whose word was as good as his bond, one I shall always remember. There was no limit to which he would not go to make good a promise made."

Frank Bastin, President, Blackford Window Glass Company:

> "We regarded Mr. Dixon as the Dean of American glasshouse engineering practice always eager to advise with or without reward. He was far ahead in ability and has accomplished much in ceramics and glasshouse developments."

Cornelius H. Tiebout, Treasurer, Gleason-Tiebout Glass Company:

> "The sunny disposition of H. Dixon at all times made it a privilege to be in his presence. His ability assured that whatever he undertook would be eminently successful."

The Glass World and What It Is Doing

News of the Industry

John D. Biggers Heads L-O-F Organization

John D. Biggers, son of William D. Biggers of Detroit, prominently identified for years with the hardware industry, and a former president of the Hardware Manufacturers' Association, has been elected president of the recently formed Libbey-Owens-Ford Glass Company. Mr. Biggers has already moved to Toledo and taken up the duties of his new office.

Mr. Biggers is internationally known in both the glass and automotive industries, his first connection with glass manufacture having begun in 1914. He was vice-president and general sales manager of the Owens Bottle Company of Toledo in 1926, a position

JOHN D. BIGGERS

which he resigned to become identified with the Graham Brothers. Later, as vice-president of the Graham Brothers Corporation in New York City, and also as a director of the Libbey-Owens Glass Company, he was intimately associated with the Graham interests in the glass manufacturing field.

Mr. Biggers was elected to his new office when the merger of the Libbey-Owens Glass Company with the Edward Ford Plate Glass Company was formally approved by directors of the former company. At the same meeting, James C. Blair, of Toledo, who has guided the Libbey-Owens Company so successfully since the death of Edward Drummond Libbey, was elected chairman of the board to succeed Ray A. Graham, who asked to be relieved of the chairmanship of the company. Through this merger, the Libbey-Owens-Ford company becomes one of the largest manufacturers of window glass and shatter-proof plate glass.

In discussing Mr. Biggers' election, Mr. Graham, who with his brothers, retains all of his holdings in Libbey-Owens-Ford, made it clear that he would continue as a director and, although relinquishing his executive duties, would retain an active interest in the new company's affairs.

"With Mr. Blair as chairman and Mr. Biggers as president, the new company finds itself under the guidance of two of the glass industry's most capable men," he said. "My own interest in the company, both financial and sentimental, is greater today than ever before, and will continue so. Mr. Biggers is exceptionally qualified for the presidency. Upon resigning as vice-president of the Owens Bottle Company, he became affiliated with my brothers and me when we were responsible for the management of Dodge Brothers, Inc., in addition to our own business—the Graham Brothers Truck Company.

"He first went to England as managing director of Dodge Brothers of Britain, Ltd., and returned to the United States in 1927 to become vice-president of the Graham Brothers Corporation in New York City. He has since continued his close association with our interests, being a director of both the Libbey-Owens Glass Company and the Graham-Paige Corporation.

"He has devoted a great deal of his time to Graham-Paige Motors, in which he was general manager of factory branches, and as vice-president and general manager of Graham-Paige International Corporation, he was responsible for having built up the extensive export business which Graham-Paige enjoys."

American Ceramic Society—Pittsburgh Section

The last meeting of the season was held on Tuesday evening, May 13, at the Bureau of Mines Building, Mr. Helsey in the chair.

Mr. J. Spotts McDowell, Director of Research of the Harbison Walker Refractories Company presented a moving picture film dealing with the manufacture of fireclay refractories. This was the first showing of the film to a technical audience. Other films are in course of preparation showing the manufacture of magnesite, chrome, and silica brick, and it is hoped to see something of these during the next season.

Stress was laid on the comparatively sudden emergence of machine methods and other technical developments in the refractories industry, and on the enormous recent growth of the technical literature. Nevertheless, many of the tests employed have no obvious significance other than to determine whether the material is substantially the same as it was the day before.

The Harbison-Walker Company operates 29 plants, and owns extensive properties as a source of its raw materials. The methods of quarrying flint clay and transporting it were shown in the film, and the subsequent processes of grinding, sieving, wet-panning, etc. The process of molding standard brick by hand was illustrated, the clay being first rough-molded in a rather wet condition, and then repressed after partial drying. This was compared with the more recent methods of power-pressing in a substantially continuous fashion. As the company makes a great number of special shapes, often quite intricate, (many being illustrated in the film), there is a good deal of work for which machines are not likely soon to be adapted.

By means of animated cartoons the methods of firing the old fashioned downdraft kilns and the modern tunnel-kilns were explained, and the film also showed the actual operation of such equipment. Tunnel kilns reaching 2400 degrees F. for 48 hours were in use.

Methods of control were touched upon, and various testing devices illustrated, particular attention being given, in the film, to the cold crushing test and the slag corrosion test.

About a hundred members were present, and a considerable discussion followed, relating largely to the reasons for the workshop details and the significance of the laboratory tests.

Following the usual custom of the Pittsburgh Section, no meetings will be held during the summer months.

February 23-27, 1931—American Ceramic Congress Cleveland Auditorium, Cleveland, Ohio

Floor plans and exhibition space rates for the second American Ceramic Congress and Exposition to be held at Cleveland, Ohio, February 23 to 27, 1931, were mailed to prospective exhibitors on May 31 by Ross C. Purdy, general secretary of the American Ceramic Society under whose auspices these expositions are held. During the same week the Annual Convention of the American Ceramic Society will take place. The convention program will be unusually complete and will thoroughly cover practically every detail of the glass and ceramic industries. An advertising campaign will be conducted in trade, city and country papers, direct mail, broadsides, and by personal invitation, designed to acquaint all individuals interested in glass and ceramics, with the activities which will be going on at Cleveland early next year. The thousands who will attend the meeting will be impressed with the fact that America is producing ceramic wares that compare favorably with those of any other country.

W. C. Taylor

W. C. Taylor, chief chemist, Corning Glass Works, sailed from New York May 9 to visit English and Continental glass factories. Mr. Taylor is making a study of various innovations in glass manufacturing in foreign countries.

Crossing the ocean is not a new experience to him inasmuch as he was practically raised on board a sailing vessel, his father being one of the sea captains who made American commerce famous. However, this trip would probably be somewhat different from the last crossing which he made from America to Europe, for on that trip as a boy just entering high school he had his hands badly cut from a troll line hooked to a big fish. It is possible, however, that he will be seen from the rear deck of the *Olympic* with a troll line trailing behind the ship making an attempt to equal his former exploit. Orange marmalade, however, will not be on his menu. On a former trip from Honolulu to New York the ship carrying a load of sugar was also loaded up with oranges for the crew. It is reported that vast quantities of marmalade were made and some considerable amount eaten. At any rate, Bill Taylor has not eaten any marmalade since.

W. C. TAYLOR

Mr. Taylor had his preliminary high school and grade school training on board ship with a private tutor. His early high school training was in San Francisco, and he graduated from English High in Boston in 1904. He graduated from Massachusetts Institute of Technology in 1908 and went directly to the Chemical Laboratory of the Corning Glass Works, then just recently formed. He left Corning to go to Porto Rico, where he was chemist in the Experiment Station of the United States Department of Soil Chemistry. After a year's work in Porto Rico he returned to the Corning Glass Works, where he has been continuously ever since. Mr. Taylor has been granted a number of patents on glass compositions, one of the most important being the joint patent of Sullivan and Taylor on the well-known Pyrex glass composition. He is also a joint recipient of the Potts medal for outstanding work in the field of industrial chemistry.

Bryan Warman Gets Important Post

Announcement has been made by G. P. MacNichol, Jr., vice-president in charge of sales of the Libbey-Owens-Ford Glass Company, that Bryan Warman has been appointed advertising manager of the company. Mr. Warman comes to his new post with a business background of unusual scope. After graduating from the University of Michigan he became connected in succession with Dodge Brothers, George Harrison Phelps, Inc., Advertisers Inc., and immediately prior to his present appointment Mr. Warman was advertising manager of Durant Motors. His experience with the above concerns has included special sales quota studies and territory analyses and practically every other department of advertising agency work including production, media, outdoor and research divisions and several years spent as account executive. He will make his headquarters in Toledo.

BRYAN WARMAN

Mr. Warman's name makes one wonder whether his original ancestor of that name did not gain it from being known as a great warrior; if so he probably has inherited fighting qualities that will be very helpful as he goes out into the glass field to "battle" for business.

Roy E. Swain Goes to Coast

Roy E. Swain, who has at various times been a contributor to our journal, has decided that the climate of Western Pennsylvania is no good. (Chorus, *Amen*). He is accordingly leaving about the first of June for Los Angeles, where he believes there may be some real weather. But he will not travel by train, as poor editors do, nor yet by the bird's way, as F. C. Flint does. No, he will travel like a good Gypsy, taking his wife and family in the family automobile, and nightly pitch his moving tent a day's march nearer Hollywood. For be it made clear, he will camp out, and not seek the shelter of taverns along the way.

We suppose that many nights he will be eaten of ants, and others of mosquitoes; further we prognosticate that tornadoes will clean up on him in Kansas, and floods in Missouri. But he says not. When finally he arrives at the Sunset Sea, we bespeak the readers of our journal out there to give him a welcome, for he intends to locate among them if they behave themselves.

Mr. Swain was formerly a Corning man, but has been with the Macbeth-Evans Company at Charleroi, Pa., for some time. It is the climate that is driving him out, for his family during their several years' sojourn at Charleroi have experienced permanent bad health there. We hope Los Angeles will be kinder in this respect.

ROY E. SWAIN

Roy E. Swain was born in Elwood, Indiana, and worked for ten or eleven years in the Elwood factory of the Macbeth-Evans Glass Company, acquiring a detailed knowledge of glass-blowing operations. Thence he went to the Corning Glass Works at Corning, N. Y., to work in the Pyrex division. Here he acquired a notable grasp of mechanical engineering subjects and evolved methods of securing charges of molten glass and several types of apparatus for effecting this purpose. These inventions caused Macbeth-Evans to secure his services for the Mechanical Development Department at their plant at Charleroi, Pa., where he has remained these eight years until now he has departed for a more congenial climate.

We wish him all prosperity in the Far West.—F. W. P.

O'Neill Intervenes as Defendant in Cox Patent Case

Action was taken on May 12 by the O'Neill Machine Company of Toledo, O., in the suit of Hartford-Empire Company against Carr-Lowrey Glass Company, filed at Baltimore, Md., on March 8, 1930 (as noted in the April issue) alleging infringement of the Cox patent No. 1,212,189, covering a method for gathering molten glass. The O'Neill Company on May 12 obtained authority from the court to act as intervening defendant in the case. The O'Neill Machine Company, answering the plaintiff's bill of complaint, admits that Charles F. Cox on the 19th of September, 1912, made application for a patent, but denies that it was made in due form of law. The intervening defendant also admits that Cox was granted a United States patent on January 16, 1917, but denies that all the requirements of the statutes of the United States then in force had been complied with. He also avers he believes that for the purpose of deceiving the public, the description and specifications of the letters patent in the case were made by Cox to contain less than the whole truth relative to the alleged invention. He further avers that the claims in the patent are vague, nebulous and indefinite, that the claims are meaningless, wherefor patent is invalid, and that no infringement has occurred. He gives a list of patents, covering improvements, which he avers Cox attempted to cover in his patent, that were covered by twenty-four other patents two years or more prior to Cox's application for a patent therefor.

In its petition to intervene as defendant the O'Neill Machine Company stated that the apparatus complained of by the plaintiff was manufactured and furnished by it, and that by reason of the defendant Carr-Lowrey Company not having sufficient interest in the result of the suit to properly defend the suit the O'Neill company desires to intervene as defendant in order to prevent injury to its business.

What "Carborundum" Really Means

Following is an abstract from a letter recently received by the Editor from Dr. R. C. Benner, director of The Carborundum Company's research laboratory, Niagara Falls, New York:

"On page 101 of the May issue of THE GLASS INDUSTRY, in the first paragraph, we find the following statement: 'And a combination of carbon and silicon gives carborundum, hardest substance next to the diamond.'

"We would like to call to your attention the fact that the word 'Carborundum' is the registered trade-mark of The Carborundum Company for its products, abrasive, refractory, mechanical and electrical. The trade-mark 'Carborundum' was first used on the silicon carbide produced by The Carborundum Company and as this product became more widely and more favorably known, the tendency on the part of the buying public was to substitute the brand name 'Carborundum' for the product name, silicon carbide, much to the detriment of our trade-mark rights to the word, since, as you are probably aware, when a coined trade-mark is too commonly used as the name of a material, it is likely to be declared a common word and as a result the owner may lose the exclusive right to the mark as well as the commercial value attached to it. The proper name for the product mentioned in your article is silicon carbide and in an article where the reference is general, as in this case, that is the form which should be used. If the reference were specifically to the silicon carbide produced by The Carborundum Company, it should read Carborundum Brand silicon carbide and not carborundum.

"If, in future articles in which the word 'Carborundum' appears, you would substitute the words silicon carbide, or, if the word must be used, you would capitalize and quote it to indicate that it has a special significance, it would be a great help to us in our effort to establish the fact that the word 'Carborundum' carries with it a trade-mark significance and is not a synonym for the chemical product silicon carbide."

A statement is being circulated by The Carborundum Company, in its campaign against the growing tendency on the part of authors to treat the word "Carborundum" as a common or generic noun. It announces that the word "Carborundum" is a trade-mark of this company, registered in the United States and many foreign countries and is applied by it to its range of products; abrasive, refractory, mechanical and electrical. Announcement states that the proper term is silicon carbide and that this is the form that should be used in articles, texts, references, etc., unless a specific Carborundum Brand product is referred to. "If the word 'Carborundum' is used it should always begin with a capital letter and be put in quotation marks to denote its trade-mark significance."

Berney-Bond Goes to Owens-Illinois Glass

The three modern milk bottle manufacturing plants of Berney-Bond Glass Company, one at Clarion, Pa., another at Hazelhurst, Pa., and one at Columbus, O. have been taken over by the Owens-Illinois Glass Company, who announced the acquisition of that company on May 26. At that time it was stated that no cash consideration is involved, the exchange of Owens-Illinois common stock for the properties and assets of the Berney-Bond concern as of January 1, 1930, having been arranged for.

Owens-Illinois Glass Company Annual Report

The report of William E. Levis, president of Owens Illinois Glass Company, at the recent annual meeting showed net earnings for the company and its subsidiaries for the year 1929 as $4,451,826 and increase of $440,507 over the preceding year. The net manufacturing profit after deduction for materials, labor, royalties, repairs, etc., was $6,926,982. Royalties accounted for $2,410,972 income and other items for $598,596. Expense and other charges, including administrative, selling, patent and royalty expense, machine development, depreciation, etc., amounted to $5,040,525, leaving after provision for estimated Federal taxes the net profit stated above. During the year 6 per cent cash dividends of $480,000 on preferred and 14 per cent on common amounting to $2,894,752 were paid and also a stock dividend amounting to $961,859, a total of $4,335,809.

The net working capital was increased from $12,802,318 at the close of the previous year, to $16,748,251 at the end of 1929. Heavy depreciation charges were deducted amounting to $1,695,563. Throughout the year nine plants were idle, several dismantled.

Successful Meeting of Glass Container Association

For the third consecutive term as President of the Glass Containers Association, Philip Z. Heuisler, president of the Maryland Glass Corporation of Baltimore, Md., was elected at the annual meeting held at Atlantic City, April 30 to May 2. Many government glass men were present and heard John D. Biggers, of the Graham organization, recently chosen President of the Libbey-Owens-Ford Glass Company, speaking on the study of markets, advise them as manufacturers to take a leaf from the book of the automobile manufacturers on the basic principles of salesmanship.

Co-operation among members was urged by other speakers, including C. R. Stevenson, business manager of the association, who reviewed the progress already made through united effort.

W. L. Davis of the Association staff reported on glass bottles for marketing motor oils. (A brief article on this subject appears elsewhere in this issue.)

The business of the glass container manufacturers, it was brought out, has suffered a decline of only 7.7 per cent for the first quarter of 1930.

Robert E. Walker of the Turner Glass Company was elected secretary and treasurer of the Association and on the Board of directors the following were re-elected: H. C. Manderville, Thatcher Mfg. Co.; H. L. Lonsdale, Phoenix-Hermetic Co.; J. H. Graham, J. T. & A. Hamilton Co.; E. F. Glacken, Atlantic Bottle Co.; F. L. Lloyd, Crown Cork & Seal Co. In addition H. G. Phillips of the Owens-Illinois Glass Co., was chosen to replace L. S. Cunningham of the D. O. Cunningham Co., resigned.

At the annual banquet a fine watch was presented to President Heuisler as a tangible expression of the appreciation of the members for his splendid work for the organization.

Permanent Receivers for Standard Plate Appointed

Within a few weeks of the election of Frank E. Troutman, who in April succeeded Charles W. Dahlinger as president of the Standard Plate Glass Company, and within a few days of the election of the new board of directors and the closing of the Butler plant, the bondholders applied for a receivership. In view of the large equity, it was considered only just that the stockholders also should be represented, and at a special meeting of the directors, John R. Eckler, D. Gregg McKee, and Frank E. Troutman were appointed temporary receivers. The appointment was confirmed on May 19, at Pittsburgh, by Judge Reed.

It is hoped to make arrangements to lease a part of the plant for the manufacture of bent glass, which has always been somewhat of a specialty with the Standard Plate and is supplied by very few concerns outside.

Libbey-Owens First Quarters

Libbey-Owens Glass Company, now Libbey-Owens-Ford Glass Company, reports for quarter ended March 31 net income of $716,773, after depreciation and Federal taxes, equal to 49 cents a share on 1,775,252 capital shares, compared with $1,299,519 in first 1929 quarter or 73 cents on same share basis.

Net manufacturing profit was $1,137,526 and $60,611 other income made total income $1,198,138. Deductions for administrative, selling, patent, experimental and development expense, doubtful accounts, contingencies, etc., were $383,365, making profit less deduction for estimated Federal tax of $716,773.

On April 24 the regular quarterly dividend of 25 cents per share of outstanding stock on May 16, 1930, was declared, payable June 1, 1930. As published elsewhere in this issue the directors of the company approved the previously announced merger with the Edward Ford Plate Glass Company of Rossford, O.

March Building and Engineering Contracts

March contracts for building and engineering projects in the 37 States east of the Rocky Mountains reached a total of $459,119,000, according to F. W. Dodge Corporation. This was the largest monthly total since August of last year: it registered the full seasonal increase of 45 per cent over February of this year, and it was only 5 per cent under March, 1929. Contracts in December, 1929, were 27 per cent under December, 1928; each succeeding month of this year has lessened the spread between current contract volume and that of a year ago. This year's first quarter contract total has amounted to $1,100,147,200, being approximately 12 per cent behind the corresponding period of 1929.

The Tariff Situation

As this issue goes to press the Tariff Bill is approaching final legislative consideration. The second conference report on the flexible tariff provision scheduled to come up in the Senate on June 2 has been well received by the Senate leaders. Senator Fess said:

> "The whole effect of the new provision is to turn the question revising the tariff to correct injustices and to meet new economic conditions over to a reorganized tariff commission of bi-partisan character, giving the President the same veto power that he has over legislation and giving to that commission for the first time a really effective basis for its accomplishment. The consummation of this provision will amply compensate for such rates, which, if necessary, can be corrected by this machinery."

Senator Watson on June 30 predicted that the bill would be passed and signed by the President before July 1.

Radio Salute to the Lime Industry

WJZ, New York radio listeners will be entertained on Tuesday evening, June 3, at 10 P. M., Eastern daylight saving time, 8 P. M. Central Standard, 7 P. M. Mountain Standard and 6 P. M., Pacific Coast time with a salute to the lime industry by Norman G. Hough, president of the National Lime Association, who will be guest speaker. His addresses will be broadcast by thirty-three stations of the N. B. C. This information should be credited to the National Mortar and Supply Company, Pittsburgh, a member of the National Lime Association.

April Production of Polished Plate Glass

The production of polished plate glass for the month of April, 1930, was 11,429,728 sq. ft., as compared with 10,415,644 sq. ft., produced in the preceding month, March, 1930, and 12,554,979 sq. ft. produced in the corresponding month last year, April, 1929.

British Glass Convention

The second British Glass Convention will be held in Boston, in September, 1930. Prof. W. E. S. Turner, Darnell Road, Sheffield, England, is joint secretary with Mr. Geoffrey Marchand, Aldwyck, London, W.C. 2.

Hazel-Atlas Glass Company directors at a meeting in Wheeling, W. Va. on May 27 elected C. R. Hubbard, vice-president to succeed the late George W. Hannan. W. H. Koch was elected a director in Mr. Hannan's place. The regular quarterly dividend of 50 cents a share and an extra of 25 cents was declared. President J. C. Brady spoke optimistically of the future.

The Roessler & Hasslacher Chemical Company's 3rd annual outing at Narragansett Inn, Lindenhurst, L. I., was held Saturday, May 4. 160 employes were in attendance. A large variety of games, races, tugs of war, etc., were enjoyed. At luncheon and dinner a short address was made by Milton Kutz, executive vice-president in charge of the New York office.

Dr. J. C. Hostetter who has been in charge of the bulb works of the Rhode Island Division of the Corning Glass Works, at Central Falls, R. I., has been appointed director of development and research at Corning, N. Y.

Professor Alexander Silverman to be feted by the Chemistry Alumni of the University of Pittsburgh, who are giving a dinner in his honor, Friday evening, June 6, in the Venetian Room, Webster Hall, Pittsburgh.

American Window Glass Company's plant at Belle Vernon, Pa., is reported working at capacity production with three twins, 350 men.

Lynch Corporation is the new name of the former Lynch Glass Machine Company of Anderson, Ind.

Recent Deaths

George W. Hannan

George W. Hannan, president of the Washington Tin Plate Company, Washington, Pa., and vice-president and director Wof the Hazel-Atlas Glass Company, Wheeling, W. Va., died at Wheeling on May 18 after a long illness.

Coming Meetings

The Stained Glass Association of America will meet in New York late in June.

The Illuminating Engineering Society will hold its 24th annual convention at the Hotel John Marshall in Richmond, Va., October 7-10, 1930.

The Eastern Division of the National Glass Distributers Association will hold its fall meeting at Atlantic City, September 3-5. The first meeting of the *Western Division* will be held at Chicago, September 10-12.

Mirror Manufacturers Association will hold a meeting under the auspices of the United States Bureau of Standards at 10 a. m., Thursday, June 12, 1930, at the Gibson Hotel, Cincinnati, Ohio, to consider the adoption by the trade of standard specifications for plate glass mirrors.

The American Glassware Manufacturers, Inc. and the **National Association of Manufacturers of Pressed and Blown Glassware** will hold their annual meeting at Toronto, Ontario, July 14. The American Flint Glass Workers Union Wage Committees will begin conferences with the manufacturers on July 15. The annual meeting of the latter organization will take place in Toronto on June 30.

What The World Wants

Specific Inquiries for American Goods Received in the Department of Commerce, Washington, D. C.

Sweden—45285. Glass, convex, for portraits.
England—45374. Glass, glaziers,' sheet or plate.
Iraq—45265. Mirrors.
Canada—45243. Glass bottles and jars.
France—45238. Glassware.

Inquiries Received

For further information address THE GLASS INDUSTRY

499. A French concern is interested in a press for working glass, 70 cm. (27") between columns; also one press for the same purpose 80 cm. (30") columns. They desire to receive plans, prices if possible and also learn freight rates, delivery date, any export charges involved, etc.

500. Kindly forward us the latest market prices on pint and quart milk bottles.

501. I should like assistance in locating a manufacturer as near Indianapolis as possible for work done in closed end cylinders approximately three feet long and which will have to be done by pressing. Average thickness will be 11/32".

502. Please give us the address of the company manufacturing the equipment used in the Cottrell Electrical Precipitation Process described in the June 1923 issue of your magazine.

503. Please tell me where I can get material, blue, for stencil sandblasting.

504. Can you furnish us with the names of glass concerns specializing in the casting of glass disks something on the order of 12" x 2"?

505. Please tell me where I can get in touch with concerns manufacturing glass edge-finishing machinery.

506. Where can I get copper foil for art glass?

Readers Wants and Offers

GLASS TECHNOLOGIST—Position Wanted

GLASS TECHNOLOGIST, with engineering experience, desires to connect with some good, progressive company who wants to do things. Now employed as factory manager in large plant. An organizer and production getter. Knows the glass business from the batch house to packing. Understands gas producer operation. Address SW.9, c/o The GLASS INDUSTRY, 24 West 40th St., New York.

EMPLOYMENT MANAGER AND PERSONNEL MAN—Position Wanted

EMPLOYMENT MANAGER AND PERSONNEL MAN, experienced on payroll and timekeeping work, wishes connection with some good firm who can use a general man in this line. Can furnish highest references. Address SW.8, c/o The GLASS INDUSTRY, 24 West 40th St., New York.

Current Prices of Glass-Making Materials

May 21, 1930

Quotations furnished by various producers, manufacturers and dealers.

		Carlots	Less Carlots
Acid			
Citric (dom.)	lb.	.46	.46
Hydrochloric (HCl) 20° tanks, per 100 lb		..	1.10
Hydrofluoric (HF) 60% (lead carboy)	lb.		.13½
52% and 48%	lb.	.10	.10-.11½
Nitric (HNO_3) 38° carboy ext. Per 100 lb.		5.50	..
Sulphuric (H_2SO_4) 66° tank cars	ton	15.50	..
Tartaric	lb.		.38
Alcohol, denatured	gal.	..	.52
Aluminum hydrate ($Al(OH)_3$)	lb.	.04½-.05	.05½-.06
Aluminum oxide (Al_2O_3)	lb	..	.07
Ammonium bifluoride (NH_4) FHF	lb.	..	.21-.22
Ammonia water (NH_4OH) 26° drums	lb.	.03	.03¼
Antimony, metallic (Sb)	lb.	..	.09⅝
Antimony oxide (Sb_2O_3)	lb.	..	.09⅝
Antimony sulphide (Sb_2S_3)	lb.	..	.14
Arsenic trioxide (As_2O_3) (dense white), 99%	lb.	.04	.04½
Barium carbonate ($BaCO_3$), Crude, (Witherite) 90%, 99% through 200 mesh	ton	47.00	..
90% through 100 mesh	ton	44.00	..
Barium hydrate ($Ba(OH)_2$)	lb.	..	.05-.05½
Barium mixture, glassmaker's, f.o.b. St. Louis	ton	25.00	..
Barium nitrate ($Ba(NO_3)_2$)	lb.	.08¼	.08
Barium selenite ($BaSeO_3$)	lb.	..	..
Barium sulphate, in bags	ton	..	..
Barium sulphate, glassmaker's, carlots, bulk, f.o.b. shipping point,	ton	15.00-16.00	18.00
Bone ash	carlots, lb.	.06	.06½
Borax ($Na_2B_4O_7 10H_2O$)	lb.	..	.0355-.0425
Crystal	lb.	.028-.033	..
Granulated	lb.	.025-.03	..
Powdered	lb.	.02875-.03375	..
Boric acid (H_3BO_3)	lb.	.0625-.07125	.06-.08125
Refined	lb.	.0625-.07125	.07125-.08125
Cadmium sulphide (CdS)—			
Red	lb.	..	.90-1.00
Orange	lb.	..	.90-1.10
Yellow	lb.	..	1.20-1.25
Chromium oxide (Cr_2O_3)	lb.	.24	.25
Cobalt oxide (Co_2O_3)			
In bbls.	lb.	..	2.00-2.10
In 10 lb. tins	lb.	..	2.15-2.25
Copper oxide			
Red (Cu_2O)	lb.	..	.30
Black (CuO)	lb.	..	.28-.30
Black prepared	lb.	.	.30
Cryolite ($Na_3Al F_6$) Natural Greenland Kryolith)	lb.	.09	.10-.10½
Artificial or Chemical	lb.	..	.09½
Epsom salts ($MgSO_4$) (imported) Per 100 lb.		..	1.15-1.20
Feldspar—			
100 mesh	ton	12.50-20.00	13.50-22.00
80 mesh	ton	11.00-11.75	14.50
40 mesh	ton	11.00	13.50
Fluorspar (CaF_2) domestic, ground, 95-98% (max SiO_2, 2½%)			
Bulk, carloads, f.o.b. mines	ton	32.50	..
In bags or barrels	ton	36.50	41.50
Formaldehyde	lb.	..	.07½-.07¾
Graphite (C)	lb.	..	.04-.07
Iron oxide—			
Red (Fe_2O_3)	lb.	..	.0450
Black (FeO)	lb.	.04½	..
Kaolin (f.o.b. mine)	ton	9.00	..
English, lump, f.o.b. New York	ton	14.50-25.00	24.50-30.00
Kryolith (see Cryolite)			
Lead chromate ($PbCrO_4$)	lb.		
Lead oxide (Pb_3O_4) (red lead)	lb.	.08	.09
Litharge (PbO)	lb.	.07	.08
Lime—			
Hydrated ($Ca(OH)_2$) (in paper sacks)	ton	10.50	..
Burnt (CaO) ground, in bulk	ton	7.00	..
Burnt, ground, in paper sacks	ton	9.00	..
Burnt, ground, in 280 lb. bbls.	Per bbl.	2.15-2.25	2.30-2.60
Limestone ($CaCO_3$)		2.00-2.50	..
Magnesia (MgO)—			
Calcined, heavy (in bbls.)	lb.	.06	.07
light (in bbls.)	lb.	..	.33
extra light (in bbls.)	lb.	..	.37
Magnesium carbonate ($MgCO_3$)	lb.	.06	.07-.10½
Manganese 85% (MnO_2)	lb.	.03	.03
Nickel oxide (Ni_2O_3), black— for nickel content	lb.	..	.35
Nickel monoxide (NiO), green— for nickel content	lb	..	.35
Plaster of Paris, bags	ton	21.00	23.00-29.00
Potassium bichromate ($K_2Cr_2O_7$)—			
Crystals	lb.	.09	.09¼
Ground	lb.	.11	.12
Potassium carbonate—94-96%	lb.	.0555	.0555
Calcined (K_2CO_3) 96-98%	lb.	.06½	.07¼
Hydrated 80-85%	lb.	.05¾	.06¼
Potassium chromate (K_2CrO_4)	lb.	..	.23-.32
Potassium hydrate (KOH) (caustic potash)	lb.	.07⅛	.08
Potassium nitrate (KNO_3) (gran.)	lb.	..	.05⅞-.06
Potassium permanganate ($KMnO_4$)	lb.	.16	.17
Powdered blue	lb.	..	.24-.26
Rochelle salts, bbls.	lb.	..	.22
Rouge	lb.	..	..
Rutile (TiO_2) powdered, 95%	lb.	.15-.20	.20-.25
Salt cake, glassmakers (Na_2SO_4)	ton	22.00	..
Selenium (Se)	lb	..	1.80-1.90
Silver nitrate ($AgNO_3$)	(100 oz.) per oz.	..	.30¾
Soda ash (Na_2CO_3) dense, 58%—			
Bulk, on contract	Flat per 100 lb.	1.22½	
In barrels	Per 100 lb.	1.55-1.57½	1.90-2.00
In bags	Per 100 lb.	1.37½-1.40	1.72½
Spot orders .. .025 per 100 lbs. higher			
Sodium bichromate ($Na_2Cr_2O_7$)	lb.	.07	.07½
Sodium hydrate (NaOH) (caustic soda) Solid	Per 100 lb.	2.95	..
Sodium nitrate ($NaNO_3$)—			
Refined (gran.) in bbls.	lb.	.03⅞	.04½
95 per cent	Per 100 lb.	2.16	2.30
Sodium selenite (Na_2SeO_3)	lb.	..	2.00
Sodium fluosilicate (Na_2SiF_6)	lb.	.05	.05½
Sodium uranate (Na_2UO_4) Yellow or Orange	lb.	..	1.50-1.55
Sulphur (S)—			
Flowers, in bbls.	Per 100 lb.	3.45	3.80-4.00
Flowers, in bags	Per 100 lb.	3.10	3.45-3.65
Flour, heavy in bbls.	Per 100 lb.	2.85	3.20-3.40
Tin chloride ($SnCl_2$) (crystals)	lb.	.39	.37½
Tin oxide (SnO_2) in bbls.	lb.	..	.40
Uranium oxide (UO_4) (black, 96% U_3O_8)			
100 lb. lots. Black	lb.	..	2.75
Yellow	lb.	..	1.50
Zinc oxide (ZnO)	lb.	.08½	.12
American process, Bags	lb.	.06½	.07
Zircon			
Granular (Milled .005-.02c higher)		.07	.07½-.08
Crude. Gran. (Milled .005-.02c higher)		.03½	.04-.05

Monthly Summary of United States Foreign Commerce in Glass

EXPORTS

Corrected to April 25, 1930

	March 1929 Quantity	March 1929 Value	March 1930 Quantity	March 1930 Value	Three Months Ending March 1929 Quantity	Three Months Ending March 1929 Value	Three Months Ending March 1930 Quantity	Three Months Ending March 1930 Value
Glass and glass products (Total)	.....	$988,277	.....	$809,811	.....	$2,724,017	.....	$2,301,157
Plate and window glass—								
Window glass, common, box 50 sq. ft.	1,127	9,166	1,019	6,399	4,002	25,545	4,535	24,917
Plate glass, unsilvered, sq. ft.	224,015	86,346	293,815	88,313	606,833	216,089	631,555	212,228
Other window and plate glass lbs.	673,611	62,473	480,776	55,314	1,247,670	129,803	1,385,657	130,665
Glass containers (bottles, vials and jars)	.....	283,549	.....	234,362	.....	818,139	.....	694,199
Table glassware, plain	.....	133,390	.....	111,500	.....	368,358	.....	321,603
Table and other glassware, cut or engraved	.....	9,480	.....	9,770	.....	24,050	.....	25,632
Lamp chimneys and lantern globes lbs.	127,968	30,401	92,204	17,018	407,609	89,426	275,690	54,248
Globes and shades for lighting fixtures lbs.	177,546	70,676	165,788	58,332	524,404	193,549	443,837	168,710
Chemical glassware lbs.	22,854	19,278	19,957	17,941	63,063	56,774	61,602	55,245
Electrical glassware, except for lighting lbs.	468,717	38,443	417,399	33,000	1,849,274	136,768	1,233,808	92,909
Other glassware	.....	255,075	.....	177,862	.....	665,516	.....	520,801

IMPORTS

Corrected to April 25, 1930

Glass and glass products	.....	880,396	.....	724,170	.....	3,158,341	.....	2,428,381
Cylinder, crown and sheet—								
Unpolished, not bent, obscured, beveled, etc.—								
Weighing less than 80 pounds per case dut. lb.	3,662,438	101,952	1,262,243	45,165	9,759,780	262,197	2,334,263	85,407
Weighing 80 pounds or over per case dut. lb.	3,030,043	95,397	861,387	34,662	8,486,345	301,676	4,847,559	187,125
Polished and bent, obscured, beveled, colored, etc., unpolished and polished, and all silvered dut.	.....	46,550	.....	32,275	.....	151,318	.....	108,039
Plate glass—								
Polished, unsilvered dut. sq. ft.	198,802	48,887	459,040	94,255	3,413,843	733,941	1,734,840	368,006
Other dut. sq. ft.	127,330	21,651	61,008	24,036	304,918	62,912	241,973	71,801
Bottles, vials, jars, demijohns and carboys, molded or pressed dut.	.....	20,764	.....	132,356	.....	74,503	.....	367,137
Table and kitchen utensils dut.	.....	15,475	.....	13,145	.....	51,592	.....	47,897
Glassware, cut or decorated dut.	.....	217,621	.....	141,561	.....	645,056	.....	442,350
Blown, glassware, n. e. s.—								
Bottles, ornaments, gauge glasses and other n. e. s. dut.	.....	44,233	.....	31,332	.....	145,110	.....	101,298
Bulbs for electric lamps dut. No. 1	1,585,450	13,368	819,744	6,835	5,618,083	44,965	3,771,929	32,485
Chimneys, globes, shades, prisms and other illuminating glassware dut.	.....	92,422	.....	30,835	.....	248,330	.....	193,074
Articles and utensils for chemical, scientific, and experimental purposes dut.	.....	45,650	.....	56,603	.....	122,804	.....	145,989
Other glassware dut.	.....	116,426	.....	81,110	.....	313,937	.....	277,773